

A N
Experimental Discourse
Of some UNHEEDED
CAUSES
OF THE
Insalubrity and Salubrity
OF THE
AIR,
BEING
A Part of an intended
Natural History of AIR.

L O N D O N :

Sold by *Sam. Smith* at the *Prince's Arms* in
St. Paul's Church-Yard. 1690.

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Preface.

HAVING heretofore had occasion
to draw together under cer-
tain Heads, divers unpublished Ob-
servations and Experiments of my
own, and some of other men, by way
of Memorials for a Natural History
of the Air; I thought fit by more
largely treating of two or three of
the Subjects distinctly mention'd
in my Scheme of Titles, to give a
Semplar or Specimen of what may
be done upon the other Heads of the
designed History. Upon this ac-

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count I treated somewhat largely of the
Salubrity and Insalubrity of the
Air, as a Subject, which for the im-
portance of it to Mens healths and
lives, I thought deserv'd to be atten-
tively consider'd, and have its Cau-
ses diligently inquir'd into. And
having observ'd that among the six
principal Causes of the healthfulness
or insalubrity of the Air, namely the
Climate, the Soil, the Situation of
the Place, the Seasons of the Year,
the raining winds and Contingen-
cies (whether more or less frequent)
and especially Subterranean Steams,
having I say observ'd that among
these Causes there was one, viz. the
last nam'd, about which, I thought
I could offer something, that I had
not met with in the Books of Phy-
sicians that treat of it; I was there-
by invited to set down my Thoughts
and Observations by way of Con-
jectures, which I was made to be-
lieve would appear uncommon, and
would

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would not prove useless. These Observations and Reflexions I refer'd for clearness and distinctions sake to four Propositions. But when I had gone thorough the three first, and made some progress in the fourth, being hinder'd by divers Avocations to make an end of it, I laid by the whole Discourse in a place which I thought a safe one, but when afterwards I had some opportunity to dispatch what remain'd, I found all the diligence I us'd to retrieve the entire Manuscript unsuccessfull. At this surprizing Accident I confess I was somewhat troubled; because whatever may be thought of the discursive part of those Papers, the Historical part contain'd divers matters of Fact, that I did not meet with in Books, nor can now distinctly remember, and will not perhaps be lighted on by even Physicians, or such Naturalists as derive their knowledge one-
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The Preface.

ly from them. It is upon this con-
sideration, that having afterwards
met with many Papers that belonged
to most parts of the unhappy dis-
course, I thought fit to put them to-
gether in the best order I could,
that I might not lose what might
give some light to so important a
Subject as the Theory of Dista-
ses. And this course I the rather
pitched upon, because before the Pa-
pers about the Sublimity of the
Air, I mis'd two other of my Ma-
nuscripts, whereof the former con-
tain'd a Collection of Medicinal
things, and the second a defence
of the Mechanical way of Phi-
losophizing about Natural Things,
as it respects Religion. And I re-
member'd that having formerly lost
a Manuscript I was much concern'd
for, I purposely made a noise of it,
whence I suppos'd the Plagiary
would conclude himself unable to
make it pass for his. And in effect
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The Preface.

the Book was in a while after privately brought back, so that I found it laid in a By-place, where I had before as fruitlessly as carefully sought it.

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AN
Experimental Discourse

Of some Unheeded

CAUSES

OF THE

Insalubrity and Salubrity

OF THE

AIR, &c.

THE sixth and last thing upon which the Salubrity and Insalubrity of the Air depends, is the impregnation it receives from Subterranean *Effluvia*. And, though this be a cause not wont to be much heeded by Physicians themselves; yet I take it to be oftentimes one of

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the most considerable in its effects.

The *Effluvia* that pass into the Air, may be distinguish'd into several sorts, according to their respective Natures, as has been elsewhere shewn; wherefore I shall now only take notice of the differences that may be taken from *place* and *time*; upon which account we may consider, that some of them arise from the *Crust* (if I may so call it) or more superficial parts of the *Earth*; and others have a deeper Original, ascending out of the lower parts, and as it were *Bowels*, of the *Terraqueous Globe*. And to this difference taken from place, I must add another, perhaps no less considerable, afforded by *Time*; which difference relates chiefly to the second sort of *Steams* newly mentioned.

Of the Subterranean *Effluvia*, some are almost constantly or daily sent up into the Air, and those I therefore call *Ordinary Emissions*; and others ascend into the Air but at times, which are not seldom distant

stant enough from one another, and those I call *Extraordinary Emissions*; whether they come at stated times, and so deserve the title of *Periodical*, or else uncertainly, sometimes with far greater, sometimes with far smaller intervals, and so may be called *fortuitous* or *irregular*. But, though I thought it might render what I am about to say more clear, if I made and premised the two foregoing distinctions, yet because in many cases, Nature does not appear solicitous to observe them, but at the same time imbues the Air with Steams referable to divers Members of these distinctions, I shall several times, though not always, take the liberty to imitate her, and consider the *Effluvia* of the *Terraqueous Globe*, in the more general Notion, that they are so.

I know 'tis frequently observed, and usually granted, that *Marrish Grounds*, and *wet Soils* are wont to be *unhealthfull*, because of the moist and crude vapours, that the stagna-

ting waters send up too copiously into the Air. And on the other side, dry Soils are, because of their being such, generally lookt upon as *healthy*. Nor do I deny, that these Observations do most commonly hold true; but yet I think, that besides what can be justly ascribed to the moist vapours, or dry Exhalations, we have been speaking of; in many places the healthfulness and insalubrity of the Air may be ascribed to other sorts of *Effluvia* from the Soil, than those that act merely, or perhaps principally, as these are either *moist* or *dry*.

PROPOSITION I.

TO deliver my Thoughts about this matter somewhat more distinctly, I shall lay them down in the four ensuing Observations or Propositions, whereof the first shall be this: *It seems probable that in divers places, the Salubrity or Insalubrity of the Air considered in the general, may be*

be in good part due to subterranean Expirations, especially to those that I lately call'd Ordinary Emissions. For in some places the Air is observ'd to be much more healthy, than the manifest qualities of it would make one expect: and in divers of these Cases I see no Cause to which such a happy Constitution, may more probably be ascrib'd, than to friendly Effluvia sent up from the Soil into the Air; which Particles either by promoting transpiration (that great instrument of health and recovery;) or by hindering the production, or checking the Activity, of Morbifick ferments; or by mortifying and disabling some noxious Particles, that would otherwise infect the Air, or by other ways, that I shall not now stay to enumerate; may not a little contribute to keep the Bodies of those that live in that Air, in that regular and desirable state, we call *Health*. I know indeed that 'tis generally thought, and often true, that Mineral Bodies do

send up Exhalations, hurtfull not only to Plants, but to Men; but when we mean Subterraneal things indefinitely, though (Men are wont to look upon them but slightly under a general confused Notion) we employ a word more comprehensive than most men are aware of, there being a great variety, as well as multitude of Bodies, that Nature has lodg'd in her dark Store-houses under the surface of the Earth. And of these differing sorts of Bodies, though 'tis probable that the greatest part are such whose *Effluvia* are unhealthfull to Men, yet there may be others whose Emanations may be friendly to him; I have known it observ'd that over some Tin Mines in the Western parts of *England*, not only Trees, but far more tender Plants, as Grass, are wont to prosper and flourish, and (if I much misremember not) I have seen verdent Trees growing just over a vein of another sort of Mineral, that lay near the surface of the Earth: And 'tis like-

likewise observable about those that constantly dig in those Tin-Mines, that they do not lead a short and sickly life as in many others, but arrive at a great and vigorous Age. And an Ancient Possessor of some of these Mines being askt by me, whether amongst the otherwise differing Exhalations that ascended into the Air, he did not find a difference as to smell bad or good ; he answer'd, that though most of those visible fumes had a smell that participated enough of Sulphur or Bitumen to be offensive, yet some others were so far from being ungratefull, that they were well scented. And on this occasion I remember, that not long since, a Friend of mine, and another *Virtuoso*, being Partners in a chargeable Attempt to discover a Mine, in digging deep for it, they accidentally broke into a vast Subterranean Cavern, into which, because the Diggers would not venture to descend, one of these curious Gentlemen caused himself to be

let down, and there found the Air very temperate and refreshing, and that he long breath'd it with delight, and on the floor, or Soil (which reach'd farther than he could discover) he found many and various Minerals, most of them embryonated, or imperfectly form'd, and store of a kind of Mineral Earth, whose smell was fragrant and very pleasant both in his Judgment, and that of some Ladies. And though, when some of those Minerals were brought to me, a small lump of this Earth that was among them, had been kept so long in the Air, as to spend most of its Odoriferous Particles, yet the smell it still retain'd, was, though but faint, yet pleasing.

That from Fossiles that lye hid under the surface of the Earth, and have a considerably large Spread, there may ascend store of wholesome *Effluvia* into the Air, seem'd to me the more probable by what I noted at my last being in *Ireland*, where, being invited by a Brother of mine
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to pass some time in a Countrey house of his, to which there belong'd a very large Sheep-walk that produc'd short, but excellent Grass; I learn'd (and was easily perswaded by some things I took notice of) that this place was justly reputed very healthfull, and this Salubrity of the Air, together with the sweetness of the Grass, some circumstances invited me to ascribe to *this*; That the Soil was sustain'd by a large tract of Limestone, which I suppos'd to emit continual exhalations into the Air; which conjecture will perhaps with the less scruple be assented to, if I add that it has been long and generally observ'd, that as far as the Limestone extends, that tract of ground makes the Snow *that* falls on it thaw, or melt much sooner, than it does on the Neighbouring Lands.

After I had made this Observation, I mention'd it in discourse to an inquisitive Person, that had seen and been employed about several Mines; and I asked him whether he had met
with

with any thing of this kind ; to which he answer'd me, that in *Derbyshire*, at a place which he nam'd to me, he and others had observ'd, that a large tract of Limestone land was so warm (as they speak) as to dissolve the Snow that fell on it, verry much sooner than another great scope of Land, which was divided from it but by a glin, where the Soil did not cover Limestone, but Freestone.

Afterwards, discoursing of this Subject with an ingenious Person, that had visited the *Hungarian*, and *Bobemian* Mines ; he told me, that during his stay among the former, he often walked abroad with the Overseer of them, a famous and experienc'd Mineralist, who delighted to breathe the fresh morning Air upon some Hills abounding with Minerals ; that his Guide made him observe, that when they were over a tract of Land that afforded much of that noble Oar (which by a *German* Name he called *Rot-gulden ertz*) he found

found the smell to be pleasing, and the Air refreshing. And whereas, in passing over some other Mines, he found himself molested by offensive fumes; he felt no such effect, when he was upon that scope of ground under which there lay veins of *Cinnabar*, or, if you please, a Mine of *Quick-silver Oar*: And his ancient Guide told him, that next the *Rotguldener ertz* before mentioned, the Soil containing these Cinnabarine veins, was that whose incumbent Air was the most eligible for pleasantness and Salubrity. And I the less wonder, that in some places the subjacent Fossiles should impregnate the Air with wholesome *Effluvia*, because I remember I had the Curiosity to ride many Miles, (though in the depth of Winter,) to see a scope of ground that was famous for a good Pottery; where, besides many other Mineral Earths that I took notice of, there was a Pit or Groove, that reach'd, if I mistake not, fifteen or twenty foot beneath the surface of the ground;

ground; whence they dug up a kind of white Clay, so richly impregnated with subtile and noble parts, that it afforded a Chymist or two of my Acquaintance (for I had my self no opportunity to distill it) good store of a Subtile Spirit, of a Volatile and Saline Nature, which upon trial they highly extoll'd for it's Cordial, and other Virtues in Physick; and which, by some peculiar Mechanical trials I made with it, I concluded to abound with a Volatile Salt, not unlike that of Urine or Hartshorn. And since by this instance we see, that some unsuspected Fossiles may be enrich'd with Medicinal and Fugitive Salts and Spirits; it may reasonably be suppos'd, that these ascending into the incumbent Air, may highly conduce to the Salubrity of it. And the Curiosity I have had to examine Chymically some Boles, and other Bodies, which are wont to be unregardedly compriz'd under the confus'd notion of *Earths*, makes me suspect, that

that there may be far more *Species* of Salubrious Fossiles than many have yet taken notice of.

But peradventure you will much the more easily admit in general, that Subterranean Tracts of great extent may for a very long time send up into the Air copious Expirations, not discernable by any of our senses, nor commonly suspected to be found in that Body, if you please to consider with me (what I do not remember to have been taken notice of to this purpose) that the common Air we live in, and breathe, does always abound, and for many Ages has been impregnated, with the Copious Magnetical *Effluvia* of the Earth; which our industrious *Gilbert*, and after him some learned Jesuits and others, have proved to be a great, though faint *Magnet*; and whose emanations, as they constantly stream through the Air, I have elsewhere by particular Experiments shewn to be capable of passing through the Pores of Glas it self, and acting almost instantaneously

taneously, and yet manifestly, upon Bodies hermetically seal'd up in it. But, *though* from what has been said it may be inferr'd, that 'tis not improbable the Salubrity of the Air in some places may be chiefly, or at least in part, due to the wholesome Expirations of Subterranean Bodies ; *yet*, generally speaking, the Air is deprav'd, in far more places than it is improv'd, by being impregnated with Mineral Expirations. And indeed, besides that, among the Minerals known unto us, there are many more that are *noxious*, than that are *wholsome* ; the power of the former to doe mischief is wont to be far more efficacious, than that of the latter to doe good ; as we may guess by the small benefit men receive in point of health by the *Effluvia* of any Mineral, or other Fossile, known unto us, in comparison of the great and sudden mischief that is often done by the Expirations of Orpiment, Sandarach, and white Arsenick ; for, though that sold in Shops

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is *factitious*, being made of Orpiment sublim'd with Salt, yet it is found *Natural* in some *Hungarian*, and other Mines. On which occasion, I remember that the ingenious Person lately mention'd to have with his Guide taken the Air upon the Hills of that Mineral Countrey, answer'd me, that, when his Guide and he walk'd over some veins of these noxious Minerals, he met with several Odorous Steams, which, though differing from one another, agreed in this, that they were all offensive to him; and particularly, some of them by their unwelcome sharpness, and others by giving him a troublesome difficulty of respiration. I will not here urge those sulphureous steams, that so suddenly deprive Dogs of sense and motion; in the Neapolitan *Grotta de Cani*; because there the Exhalations are too much included, and as it were pent up: But it is very proper to allege for my present purpose the *Aorni* or *Averni*, which are mention'd

tion'd by good Authours to be found, some in *Hungary*, and some in other Countries; for in these places there ascend out of the Earth such noxious and plentiful exhalations, as kill those Animals that draw in the Air they infect; and some of them are able to precipitate, even the Birds that fly over the Caverns that emit them. But there are a multitude of Places, where 'tis not so manifest that hurtfull exhalations ascend into the Air, and yet they really do so: There being in many places whole tracts of Land, that near the surface of the Earth abound with Marchasitical Minerals, as these do with a sharp vitriolate Salt, which, together with the ill condition'd Sulphur that they also plentifully contain, ascend into the Air, and render it corrosive. On which occasion I remember, that for Curiosities sake I took some English shining Marchasite; and caus'd a pound of it to be distill'd in an Earthen Vessel with a good fire, by which means, notwithstanding it's dryness,

dryness, I obtain'd two or three spoonfuls of a Limpid Liquor, that smell'd very strongly, like that which the *Helmontians* call *Gas Sulphuris*; and which appear'd manifestly to be of an acid Nature, both by the taste, and by it's readily corroding, and dissolving unbeaten Coral, even in the cold, to mention here no other Tryals that I made with it. And the Mineral afforded me, together with this Liquor, about an ounce and three quarters of inflammable *Sulphur*, part whereof ascending (as may be guess'd) in the form of very agile Corpuscles, these fasten themselves all about to the inside of the Receiver, and there compos'd divers thin Coats, or Films, as 'twere, of Sulphureous matter sticking to one another; which at their first taking off, and for some time after, might be bent or folded like leaves of paper, but afterwards harden in the Air. Mineralists, and some other good Authours, mention divers Places as abounding with Mar-

chafitical Fossiles, but I am apt to think, they are far more common than is vulgarly taken notice of; for I have met with them where one would little expect them. And, though in *England* all our Vitriol (which is now plentifully vended into Foreign parts) be made of Vitriolate Stones, or Bodies that pass for stones; yet that is not true which our Mineralists are wont thence to conclude, that there is no other Vitriolate or Marchasitical matter in *England*: for a famous dealer in Fossiles, having found a Mine, which he knew not what to make of, and therefore carefully conceal'd, address'd himself to me, because, he said, he knew I would not betray or supplant him: and having at his desire taken a private view of what he had discover'd, I presently found it to be a vein, that lay at some depth under ground, and ran along (how far I know not) like a vein of Metalline Oar, (and for such upon that account he mistook it) consisting of a black

a black and heavy stuff, which upon a few easie trials I quickly found to be of a Vitriolate Nature; inso-much that, somewhat to my wonder, I was able to make it yield in few hours store of pure Vitriol, without any troublesome or artificial preparation.

PROPOSITION II.

It is probable that in divers places some Endemical Diseases do mainly, or at least in part depend upon Subterranean Steams.

Under the name of *Endemical Diseases*, I do not comprise those onely that are very peculiar to this or that Countrey; as the *Plica* is said to be to *Poland*, (whence it receives its name of *Polonica*;) or an odd kind of *Colique* in one part of *France*, (from which 'tis called *la Colique de Poictou*;) but also those that are more rise in some Coun-

tries than in most others ; such as *Agues* in *Kent*, and in that part of *Essex* they call the *Hundreds* ; the Consumption (though that be an ambiguous name) in *England*, whence Foreign Physicians call it the *Tabes Anglica* ; and *Fluxes* of the Belly in *Ireland*, where they are so rife as commonly to pass under the name of the *Countrey Disease*.

That these *Endemical*, or (if we may so call them) *Topical* Distempers, do in *many places* proceed from some excessive Heat, Moisture, or other manifest quality of the Air ; from bad Diet, vulgar Intemperance, and other Causes that have little or no connexion with *Subterranean Reeks*, I readily grant. But, that in *some places* the *Endemical Disease* may either be principally *caus'd*, or much *fomented*, by noxious *Effluvia*, I am inclin'd to suspect upon the following grounds.

I. There are some places, in which the *Endemical Disease* cannot be probably imputed to any manifest Cause ;

Cause ; as he may perceive that shall consider how often it happens, that the Causes which are assign'd of such Diseases, if they were the true ones, must produce the like Distempers in many other places, where yet it is notorious that they are not *Endemical*.

2. That Subterranean Bodies may send up copious Steams, of different kinds, into the Air, has been already made out.

3. It has been also shewn, that the Matters that send up these *Effluvia*, may be of a large extent. And I remember on this occasion that I have sometimes observ'd, and that in more Countries than one, a whole tract of Land that abounded with Minerals of one kind ; and within no great distance, as perhaps a Mile or a League, another large tract of Land, whose Subterranean part abounded with Minerals of a very differing sort.

4. We have also above declar'd, and 'tis highly probable from the

nature of the thing it self, that those copious steams (Saline, Sulphureous, Arsenical, Antimonial, &c.) that impregnate the Air, may very much conduce to make it hurtfull to a humane body, in the way requisite to produce this or that determinate Disease: as I not long since related from the Chymist that visited the *Hungarian* Mines, that in some places he found the Reeks ascending from them into the Air (though in an elevated place, and expos'd to the Winds) make him as it were Asthmatical, and give him a troublesome difficulty of Respiration. And here let me add an Observation, which perhaps will not be thought fit to be slighted by Physicians: namely, that some parts of the substance of the Air (for I speak not of its Heat, Coldness, or other such Qualities) do not onely affect humane bodies, or at least many Individuals among them, as they are taken in by Respiration, but as they outwardly touch the Skin; and the skin

Skin being (as I have elsewhere shewn) full of Pores, and those perhaps of different sizes and figures, those Corpuscles that get in at them may have their operation, even upon the most inward parts of the body. To make this more clear and probable, because 'tis a thing of importance, I desire these things may be observ'd.

1. That when I speak of the Air, I do not in this place understand that Air, which I elsewhere teach to be more strictly and properly so call'd, and to consist of *springy* Particles; but the Air in its more vulgar and lax signification, as it signifies the Atmosphere, which abounds with vapours, and exhalations, and in a word with Corpuscles of all sorts, except the larger sort of springy ones; and many of them may be so small, and so solid, or so conveniently shap'd, as to get entrance at some of the numerous Orifices of the minute or miliary Glandules of the Skin, or at other Pores of it.

Thus, though paper be not pervious to the uncompress'd elastical parts of the Air, yet it may be easily penetrated by other Corpuscles of the Atmosphere: for I remember, I have for Curiosities sake prepar'd a dry body, out of a substance belonging to the Animal Kingdom, which being lapt up in paper, would, without wetting or discolouring, or any way sensibly altering it, pass in a trice through the Pores of it in such plenty, as to have not onely a visible, but a manifest operation on bodies plac'd at some distance from it. And though a bladder almost full of Air, having its neck well tyed, be held near the fire in various postures, the elastical Air, though rarefied, or attenuated by the heat, will rather burst the bladder, (as I have more than once found) than get out at the Pores, yet we have often made a certain substance, belonging to the Mineral Kingdom, that, if a bladder were wet or moist, (as the Skins of living Men are wont to be) would readily

ly pervade it, and have a sensible operation, even upon solid bodies plac'd within it. This Experiment (that I can repeat when I will) is therefore the more considerable to our present purpose, because in the bladder of a dead *Animal*, the Porosity may be well suppos'd to be much less than it was in the Animal when alive; in which state the parts of the humane body are much more perspirable than one would easily believe, partly because of the heat that is continually diffus'd from the heart, and partly because of the copious steams that are in perpetual motion, and keep the parts warm, moist and supple: And it is not to be pretermitted in our present instance, that the bladder of Urine consists not of a single Membrane, and is probably of a stronger texture, by reason of the subtile salt liquor it is instituted to contain, than many another Membranes of the body, or the Epidermis. And this is the first thing I would have noted.

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The next is, that, whereas in the Instances newly recited, and some others that are by and by to be mention'd, the effects were produc'd when the ambient Air, impregnated with Mineral Corpuscles, had but a very short time (perhaps not many minutes) to work upon the bodies expos'd to it : In those Countries that are very subject to Endemical Diseases, the Inhabitants are wont to live all the year long, and perhaps during their whole life, expos'd to the action of the vitiated Air : and how much a far shorter time will serve, to make the Corpuscles that rove in the Air, penetrate into bodies of no very close contexture, may be guess'd by the breaking even of the bigger strings of Lutes and Vials, by the numerous (though invisible) vapours, that get into them in rainy weather ; and much more by the effects of such vapours, when insinuating themselves in swarms into the Pores of a Rope, they shorten it so forcibly, as to enable it, by shrinking

king it self to lift up and keep suspended considerable weights, as I have elsewhere shewn by tryals purposely made. These things may render it probable, that, *though* in a small compass of time the noxious *Effluvia* that rove in the Air, may be too thinly dispers'd in it, to insinuate themselves in any considerable number at the Pores of the Skin; yet, by reason of the continual contact of the Air, (especially as to the Face, Hands, and some other parts) which may last day and night for many months, or perhaps years, there may be opportunity for a considerable number of morbidick Particles, to insinuate themselves into the cutaneous Pores.

3. And thus having once got entrance, they may by the capillary Vessels that reach to, or terminate at the Skin, pass on to somewhat larger Vessels; and so may get into the mass of bloud, and by its Circulation be carried to all the parts of the body; and so be enabl'd both to de-

deprave the bloud, and other juices themselves, and to gain access to any determinate part of the body, which their peculiar shapes, figures, &c. qualifies them to produce some particular Distemper in. This whole Doctrine may be made more probable, by what experience shews of the virtues of certain *Plasters*, especially *Mercurial ones*, in Distempers that are not at all, or at least are not chiefly *Cutaneous*; and (which comes more home to our Argument) of the efficacy of *Periaptæ*, and *Appensa*, such as *Piony-root*, *Bloud-stone*, *Lapis Nephriticus*, *Quick-silver* in a *Quill*, a *dry'd Toad* in a *Cesnet Bag*, &c. whereof, though many answer not the Characters that are wont to be given of them, yet some of them, experience has convinc'd me to be of greater efficacy than I expected: And much more activity may be presum'd to be, in divers noxious *Effluvia* from *Subterranean Bodies*; as may be gather'd from the effects of the *Mercurial Girdles*, that some unwary

wary persons wear to cure the Itch; and from what I elsewhere relate of the fits of the *Colicque*, often produc'd in a Friend of mine by the *Effluvia* of masses of *Loadstone*. And this last example may serve for a proof of another part of our *Hypothesis*, by shewing that *Mineral Effluvia*, may not onely be noxious in a general way, but may produce this or that determinate Disease. That *Arsenical Appensa*, though much extoll'd by divers *Physicians* themselves, and sold dear by *Empyricks*, as (if worn near the Heart) wonderfull *Amulets* against the *Plague*, have (especially in some persons and circumstances) produc'd some of the noxious effects of *Arsenical Poysons*, and particularly caus'd in some great faintness and dispiritedness, I find by the Testimony of divers eminent *Physicians*. To which I shall add a remarkable one, which may probably be referr'd partly to this third Observation, as well as to what I lately deliver'd about the bad effects
of

of *Mineral Exhalations*, breath'd in with the Air they vitiated : and I therather mention this Case, because 'tis not onely an odd one, but is a considerable Argument to shew, that noxious *Mineral Expirations* may manifestly produce a determinate Distemper in unlikely parts of the body. The Observation is this ; I knew, and on some occasions employ'd, a *Chymical Laborant* that fanci'd that he could make a rare Medicine out of *red Arsenick*, (as some call what others style *Sandarach*,) which is thought to differ little from common *Orpiment*, saving its being much higher colour'd : this *Laborant* then working long and assiduoufly upon this Mineral, and rubbing it frequently in a Mortar, came divers times to me ; and complain'd of a *disaffection* he, thence contracted in the *Organs of Respiration* ; for which I gave him something that happen'd to relieve him ; which encourag'd him to complain to me of another Distemper, that, though
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not so dangerous, did often very much molest him: which was, that when he was very assiduous in the preparation of his *Sandarach*, it would give him great *Pains*, and (if I misremember not) some *Tumours* too, in his *Testicles*: And this, for ought I know, happen'd to him as long as he was earnest about that Process; for the Medicines that had reliev'd him in his other Distemper, did not remove this: and I having occasion to go for a while into the Countrey, found him gone at my return. It may strengthen the Conjecture lately propos'd, of the possible insinuation of *Effluvia* that rove in the Air, at the Pores of the Skin, if I add that I have had the Curiosity to enquire of more than one Traveller, that had visited the famous *Pico* of *Tenarif* (at whose upper part there are found scatter'd parcels of *Salphur*, and divers manifest tokens of a *Vulcan*) whether the *Sulphureous Steams* (that I suppos'd to be copious near the top of the Moun-

Mountain) did not work upon the *silver* Money they had in their Pockets, and discolour it: to which he answer'd that 'twas no uncommon Observation, to find at mens return from visiting the top of the Hill, that the Money they carried about them was blackn'd, and that he himself had particularly observ'd it to be so: which might easily gain credit with me, who have divers times made a preparation of *Sulphur*, which, even in the cold, sends out exhalations so penetrant, that, having for tryals sake put some pieces of *Coyne* (which ought not to be *Golden*) into a Leather Purse; they were able, and that in not very many minutes, to discolour manifestly the Money, in spite of the interposition of the Purse that contain'd it. But I had a more considerable instance of the efficacy of the Sulphureous Expirations of the *Pico of Tenariff*, by a sober Person that is one of the chief Directours of the famous *East-India-Company* of *London*; who, being

being question'd by me about some circumstances of his Journey to visit the top of that stupendious Mountain, answer'd me, that among other effects the Sulphureous Air had upon him, (who is of a very fine complexion) he found at his return to the bottom, that his light-colour'd Hair had manifestly changed colour, and was in many places grown forked at the ends. These Observations may make it probable, that *Mineral Exhalations* may not only affect humane Bodies, as they are drawn into the Lungs with the Air they swim in, but as they insinuate themselves into the Pores of the Skin.

One considerable Objection I foresee may be made, against the Proposition I have been all this while endeavouring to render probable; namely, that 'tis scarce conceivable, that in so many Ages as *Endemical Diseases* have afflicted some Countries, the Subterranean Matter, to which I do in great part impute some of them, should not be

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wasted and spent. I might perhaps on this occasion move a doubt, whether we have had such continued accounts of the temperature of the Air, of all the Countries where Diseases are now *Endemical*, as to know that they have been always so; and that some of those Diseases have not been worn out here or there, and some others have not of later Ages begun to appear in this or that place. But contenting myself at present to have hinted this Question, I shall not stay to discuss it; but proceed to offer three things, by way of direct answer to the Objection.

1. And first, I think it very possible, that divers Subterranean Bodies that emit *Effluvia*, may have in them a kind of propagative or self multiplying power: I will not here examine, whether this proceed from some seminal Principle, which many Chymists and others ascribe to Metals, and even to stones, or (which is perhaps more likely) to something analagous to a Firment, such as in
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Vegetables enables a little sour dough to extend it self through the whole Mass; or such, as when an Apple or Pear is bruise'd in one part, makes the putrify'd part by degrees to transmute the sound into it's own likeness; or else some maturative power, whereby an inanimate Body may gradually admit of such a change, or acquire such Qualities, as may be in Mens estimate perfective of it, and perhaps give it a new denomination; as *Ananas* in the *Indies*, and Medlars, and some other fruits here in *Europe*, do after they are gathered, acquire (as it were, spontaneously) in process of time, a consistence and sweetness, and sometimes Colour and Odour, and in short such a state as by one word we call *maturity* or *ripeness*: and so some Metalline Ores, and some Mineral Earths themselves, have been observ'd by Mineralogists, to acquire in tract of time such a change, as to afford some Metal or other Body, which either it did not afford before, or at least did not afford

so copiously, or so well qualify'd. This I have purposely made out in another Paper: and the Observation particularly holds as to *Niter*, which is thought to be the most Catholick Fossile we have; and to be at least one of those Fossiles, that do the most plentifully emit *Effluvia* into the Air.

2. When I consider, that even in those Mines that are accounted deep ones, the Spades of Men are not wont to reach to the ten thousandth part of the thickness of the Earth, between its Surface, and its Centre, which yet is but its Semi-diameter; I cannot but confess, that we know very little of the Nature or Constitution of the lower part of the Terrestrial Globe; since we know little or nothing experimentally, of what lyes beneath that Comparatively very thin Crust or Scurf, (if I may so call it) that Humane Industry has been hitherto confin'd to. And upon this account I do not think it absurd to suspect, that from the lower Subterranean

raeal Regions there may be, either continually, or periodically, emitted into the Region of Mines (if I may so call it) great store, and variety of Mineral Exhalations, which may continually repair the loss of those, that from time to time ascend out of the Fossile Region (as I may also call that of Mines) into the Atmosphere. But the things I could alledge to Countenance this Conjecture, must not be insisted on in this place. Therefore I proceed to consider.

3. That Bodies so heavy, and consequently so abundant in parts of solid matter crouded together, as Minerals, and other Fossiles are wont to be, may well be suppos'd capable, without destructively wasting themselves to emit store of such minute Particles as *Effluvia*, for an exceeding long time. This will be easily granted by him that shall consider the particulars laid together in a small Tract, that I purposely writ, about the admirable Subtilty

of *Effluvia*. And 'twill be the more easily believ'd, if it be consider'd how long some Load-stones, sever'd from their Mine, have been kept in the Air without any notable, or perhaps so much as sensible diminution of their Virtue. And this brings into my mind what an eminent Physician, who was skill'd in Perfumes, affirm'd to me about the durableness of an Effluviating power, that was not natural to a Metal, but adventitious, and introduc'd by Art: for he assur'd me that he had a Silver Watch-case, that had been so well perfum'd, that though he usually wore the Watch in his Pocket, it continued to be well scented sixteen years. The same Person had a way of perfuming factitious Marble quite thorough, whose grateful Scent he affirm'd would last exceedingly; and of this perfum'd Marble he presented me a Ball, which having been some months after gotten from me by a great Lady, I was disabled from observing the durableness of the fragrancy. I

I might perhaps be thought wanting to my Cause, if, before I dismiss the Proposition I have been all this while discoursing of, I should not observe, that Subterranean *Effluvia* may contribute to *Endemical Diseases*, not only as they vitiate the Air, that Men breathe in, or are immediately touch'd by; but as they may impregnate or deprave the Aliments that men feed upon. For first, they do mingle themselves with the *water*, which either men drink it self alone, (as is the Custome with many Nations, and of some men in most Nations; or make of it their Bear, Ale, or other factitious drinks, prepar'd of *Water* and Barley, Oats, Rice, &c. That divers Springs, and other Waters are imbued with Mineral Corpuseles, may be judg'd by some of the Medicinal Springs: for, though divers *Acidule* and *Therma* afford good store of palpable Sulphur or Salt, yet all do not; and having purposely examin'd a famous one, I could with a pair of nice Scales

scarce discover any sensible difference at all between the *Medicinal Water*, and the *common Water* that was to be met with thereabouts. And that which impregnated this, and which I found by tryal on my self, and some other Bodies, enabl'd it to work very manifestly like a Mineral Water, was a sort of Corpuscles so minute and subtile, that if the Bottles were not kept well stop't, they would in a short time vanish, and leave the Liquor dispirited. Experience has assur'd me, that there are ways of making common water violently and hurtfully operative upon Humane Bodies, though its sensible qualities would not make one suspect any change in it : but the ill use that bad men may make of such Liquors, makes me forbear to express my self more clearly : nor is it necessary that I should add any thing to confirm the propos'd conjecture, save what may be inferr'd from these two Particulars ; the first whereof is the scarce at all sensible change

change that may be made in water, and some other Liquors, that are made strongly Emetick by *Crocus Metallorum*, and by Antimony vitrify'd without addition: and the second may be taken from those *Averni*, whence there continually ascend such pernicious Exhalations, as in some places intoxicate or kill even the Birds that fly over those poysonous vents; for if such Exhalations, or even far less deadly ones, should (as they may be reasonably suppos'd, sometimes to do) meet with either running or stagnant Waters in their ascent, there is little doubt to be made, but they will impregnate them, and make them noxious. And on this occasion we may pertinently recall to mind, what I have formerly deliver'd about a place upon the Borders of *Lancashire*, where the Water and Mud of a Ditch is so copiously impregnated with Subterranean Exhalations, (whether they be bituminous, sulphureous, or of some

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unknown kind) that they may easily be fir'd at the surface of the Water, or Earth, and made to burn like a Candle, as an ingenious man did at my Request successfully try.

But there is another account, upon which the *Effluvia* of the lower parts of the Earth may have a greater stroke in producing of Endemical Diseases; namely, as they mingle with the Water, and other Liquors that are necessary to the nutrition and growth of Plants; and, by depraving those juices, make the vegetables that are nourish'd by them unhealthy for the men that eat them, or make drinks of them: and these noxious Exhalations may be suppos'd in many places to impregnate the juices of the Earth, much more copiously than they do the running or stagnant Waters lately spoken of: because the difficulty of pervading the Earth in their ascent, may so long check them, as to make them very numerous in a small space, and perhaps make them convene into Bodies, so far of a Saline Nature as to be

be dissoluble either in common Water, or some other Subterranean Liquor; by whose help, as by vehicles, they may insinuate themselves into the roots of Plants, and be thence conveyed to other parts. Divers things might be alledg'd to keep this conjecture from being improbable, if I had leisure to insist on them; but I shall now only mention two things that on this occasion come into my mind: the first whereof is, that enquiring of a famous Chymist, who liv'd in a Countrey abounding with Mines of Vitriol, whether he did not observe, that the Oaks growing over them were more solid, or heavy, than those Trees are elsewhere wont to be; he answer'd me, that he did, and that the difference was remarkable: The other is, that the parts of some Minerals, (probably by reason of the smallness and solidity of the Corpuscles they consist of) are capable of insinuating themselves very plentifully into the pores of growing Vegetables, without being really subdu'd by what

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Philosophers are pleas'd to call the *Concocting Faculty* of the Plants; and, instead of being assimilated by the Vegetable, they retain their own Mineral Nature, and upon the recess or evaporation of the juice that serv'd them for a vehicle, may sometimes discover their being Mineral, even to an unassisted Eye. For I remember I have seen a piece of a Vine, that grew not far from *Paris*, which being broken, I perceiv'd a multitude of the internal Pores of the root, and, if I mistake not, part of the Trunk also, to be stuff'd with Corpuscles of a Marchasitical Nature; as manifestly appear'd by their Colour, and their shining lustre, and also by their weight.

There goes a Tradition among learned Men, that the leaves of Vines that grow in some places of *Hungary*, whose Mines afford Gold, are as it were gilt on the lower side, by ascending Exhalations of a Golden Nature: whether this be true or no, I shall not take upon me to determine: but I remember, that having made enquiry
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about the truth of it, of a very ingenious Traveller, whose Curiosity led him to visit heedfully those famous Mines; he told me, that he did not remember he had observ'd what is reported about the Leaves of the Vine: but he knew very well that at *Tockay* (a place that affords the famousst Wine of *Hungary*, and indeed the best I have drunk) very many of the kernels of the Grapes would appear gilt over, as it were, with leaf gold. To what has been already discours'd, may be added, that since men are not wont to feed upon either Beasts, or Birds of prey, as carnivorous Animals usually are, but upon such as live upon Grass, or Seeds, or other vegetable substances, and drink nothing but fair water; the noxious exhalations that make vegetables, and water unwholesome, may by *their* means have a very bad influence upon Sheep, Cows, Deer, Pigeons and other Animals that feed upon such deprav'd vegetables, and drink such noxious water; and consequently may be very harmful to those

those men that feed upon such Animals, and may by the deprav'd aliment they afford, determine them to an Endemical Disease, such as that vitiated nutriment is fitted to produce.

Perhaps it will not seem improper to add on this occasion, that 'tis possible that in certain places the latent Minerals may be of such a Nature, as that their *Effluvia* may, instead of promoting, hinder the Production of some particular Disease, whether Epidemical or Endemical in the Bodies of them that inhabit those Places. For as Physicians observe that the more manifest morbid causes of some sicknesses, are quite contrary to those of others, so I think it not improbable, that there may also be a mutual contrariety, between those latent morbid causes, that are sent up by subterranean Agents. And therefore it need be no wonder, if some of these should either disable those to which they are Hostile, or should at least work in Humane Bodies a great Indisposition to admit their hurtfull

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Operations, which methinks those Physicians and Chymists should easily grant, who with a boldness that I do not applaud, prescribe Amulets, wherein Arsenick, or some other poysonous Drug is employ'd, as preservatives from the Plague, against which, I doubt the chief Succours they afford, proceeds from the Confidence or Fearlesness they give those that wear them. But to return to our subterranean *Effluvia*, since there are divers whole Countries, or lesser places, that are either altogether, or in great part, free from this or that particular Disease; as in several parts of *Scotland* from Agues, especially if I mistake not Quartans, are very unfrequent, insomuch that a learned Physician answer'd me, that in divers years practice he met not with above three or four, and in several large Regions of the *East-Indies*, notwithstanding the excessive heat of the Climate, the Plague is very rare: since (I say) these things are so, it seems not altogether improbable that the subter-

terraneal steams may contribute to this advantage, by impregnating both the Air, the Earth, and the Water, with Corpuscles endow'd with Qualities unfriendly to these Diseases, which seems to be somewhat the more credible, because it has been observ'd that some vast Tracts of Land will neither breed nor maintain venomous Creatures, as is undoubtedly believ'd of the whole Kingdom of *Ireland*, where I confess I neither did see any alive, nor met with any other that did; for as to Spiders, though they breed in that Countrey, where I have seen many of them, and sometimes even upon *Irish* Wood, yet they are unanimously believ'd not to be poysonous there: And some Writers tell us, how truly I know not, of some other Countries, to which they affirm the like Privilege to belong. But there is one instance afforded us by *Begninus*, who travel'd much to visit Mines, which if it be strictly true, is very notable for my present purpose. *Dignum admiratione est*, says he, *quod quamvis in vicinia Hydrie*
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Comitatus Gloriciensis, ubi reperitur copiosè & singulis ferè annis Lues pestifera grassatur, illa tamen semper immunis ab hac manere soleat, idque viri provec̃tæ ætatis se observasse & à majoribus suis accepisse, mihi sanctè confirmârunt. To which I should add the Testimony of the Learned *Michael Mayerus*, who pronounces Mercury to be an *Alexipharmacum* against divers Diseases, and particularly the Plague, if I did not suspect by his way of mentioning this last Disease, that he but borrowed his *Encomium* of Mercury from *Begnius*. But however; what has been related, has invited me to consider, whether there may not be some virtue, as well as some danger, in Amulets of Quick-silver that are by many extoll'd against the Plague. But this onely upon the bye,

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PROPOSITION III.

It is Likely, that divers Epidemical Diseases are in great part produc'd by Subterranean Effluvia.

I Am very well aware, that divers Diseases that extraordinarily invade great numbers of people at the same time; (and were therefore, by the Greeks called *Epidemical*) may be rationally refer'd to *manifest Intemperatenesses* of the *Air*, in point of Heat, Cold, Moisture, or some other *Obvious Quality*. And therefore the *Proposition* speaks but of *some Epidemical Diseases*, and imputes those it speaks of to *Subterranean Effluvia*, not as *total*, but as *partial*, and sometimes as *principal*, *Agents* in the production of them.

In favour of the propos'd Conjecture thus explain'd, I shall offer two things to Consideration.

I. And first, it seems not very improbable, that divers of those *Morbisick Excesses* (especially if they be *sudden*) that are observ'd in the *Air*, may proceed from the unusually copious ascent of hurtfull *Exhalations* that mingle with the *Air*, and diffuse themselves through it. We are greater Strangers than we commonly take notice of, to the *Subterranean* part of the Globe we inhabit: and if I had leasure, and thought it necessary, I could shew, that there are a great many odd and surprizing things to be met with in the Structure and disposition even of those parts of the Earth, that lie but a little way beneath the surface of it, and partly have been, and partly may easily enough be, actually penetrated by the industrious Labours of men. And as for the deeper *Subterranean Regions*, we are so much more unacquainted with them, that we are scarce fit so much as to *conjecture*, how far they extend, or what

what kind of Materials they contain, and what is the gross, and (if I may so speak) the Mechanical Fabrick of the greater Masses, whether solid or fluid, they consist of: And least of all can we determine what Motions, whether periodical, or others, these Masses, or other Portions of deeply lodg'd Matter, may have.

On such grounds as these, I conceive it possible, that, among the many and various Effluviating Bodies, that the terrestrial Globe may conceal in its Bowels, there may be some, whose reeks ascending plentifully into the Air, may occasion in it an excess of Heat, Cold, Moisture, thickness, or some other manifest Quality. So that sometimes (not to say many times) even those manifest Intemperatenesses of the Air, to which an Epidemical Disease is wont to be wholly imputed, (though perhaps not very justly) may in part proceed from Subterranean Bodies; for I elsewhere shew, that these by their Conflicts, or Mutual Actions on

one another, may excite great and sudden Heats, and on that account send up such copious Steams into the Atmosphere, as may produce there sudden and excessive Heats, Lightnings, Thunders, &c. And I shall now add (what perhaps will appear somewhat strange) that I think sudden and unseasonable Refrigerations of the Air, may proceed from the action of Subterranean Bodies upon one another: for Tryal purposely made has inform'd me, that there are certain Minerals, whereof some may be employed in their crude Simplicity, and the other requires but a slight Preparation, such as it may have in the Bowels of the Earth; which Minerals being put together, will produce by their Reaction an intense degree of Cold, not onely as to sense, but when examined by a seal'd Weather-glass.

The Changes of the Air that produce *Epidemical Diseases* are sometimes so great and sudden, that they cannot, in my Opinion, with pro-

probability be imputed to the action of the *Sun*, or the *Moon*, (which are causes that act in too general, and too uniform a way, to have those particular and anomalous Effects attributed to Them;) as probably as they may be to *Subterranean* Bodies, that often act with more suddenness and impetuosity, and without any regularity, at least that is known to us. The difference we find in Seasons, that bear the same name, and should be alike in temperature, is oftentimes very great, and sometimes also very lasting. It is proverbially said in *England*, that a *Peck of March Dust is worth a King's Ransom*: So unfrequent is dry Weather during that Month, in our Climate. And yet in some years, and particularly the last, 'twas a rare thing to have a shower either in *March*, *April*, or *May*, sometimes in the Month last named, there are Heats greater than in the Dog-days of that same Year; though usually here in *England*, divers Mornings of that Month are

cold, and some of them frosty. And now and then I have observ'd in the same Months and Days, at no great distance from one another, that the Weather has been sultry hot, and has also produc'd a great Snow. We have seen Summers like that which is remember'd for the Siege of *Colchester*, that for almost the whole Season, were more dark and rainy, than several Winters have been observ'd to be. To which purpose I remember, that when I was about to write the History of Cold, I was fain to watch almost a whole Winter to find two or three frosty days, to make an Experiment or two I had need of, that requir'd not a Cold that was either lasting or very intense. But Instances of this kind are so obvious, to those that are at all heedfull Observers, that I may safely pass them by, and inculcate that the Sun being in the same Signs, at the same Times of the Year, it does not appear, how He should produce so great a disparity
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of the temperature of the Air in Seasons of the same denomination; (as the Winters or the Summers of differing, and yet perhaps immediately consecutive, Years.) And therefore I do not so much wonder, that many Learned Writers fly to Astrology for an account of these irregular *Phænomena*, and ascribe them to the influences of certain Stars; notwithstanding what divers eminent Philosophers, and some great Astronomers too, have said to prove the vanity of Judiciary Astrology.

I shall not now stay to discuss the Question, *whether the Stars have any influence distinct from their Light and Heat*: because, my Opinion about it being somewhat peculiar, I have discoursed of it in a Paper by it self. But this I shall now say, that the fixt Stars being but general, and (if I may so speak) indefinite Agents, almost unimaginably remote from us, 'tis nothing near *so* likely that such Effects as (besides that they happen very suddenly and irregularly)

ly) are oftentimes confin'd to a Town, or some other narrow Compass, should be produc'd by certain Stars: as that they should be so by Subterranean Bodies, which are near at hand, of very various natures, and subject to many irregular and differing Motions, commixtures, reactions, and other alterations. I have known a great Cold in a day or two invade Multitudes in the same City, with *violent*, and as to many Persons *fatal* Symptomes; when I could not judge, (as others also did not) that the bare coldness of the Air could so suddenly produce a Disease so Epidemical and hurtfull: and it appear'd the more probable, that the cause came from under ground, by reason that it began with a very troublesome Fog.

That there may be many Subterranean Bodies, which by their commixtures may produce a sudden Heat, will be easily granted by those that know, (what I elsewhere purposely make out) that there are Subterranean

neal *Menstruums*; and are acquainted with Chymical Operations, such as the great effervescence made, when Oil of Vitriol is put upon filings of Iron, or Spirit of Niter upon Butter of Antimony; to which I might add many other of the like kind that I have tryed, as when Spirit of Niter is put upon filings, either of Iron, Copper, or Tin, or upon crude Quicksilver; which I shall content my self to have nam'd, because I have another Instance that comes closer to our present purpose. For whereas I have shewn above, that there is in many places great store of Marcasitical matter beneath the surface of the Earth, and sometimes very near it; I shall now add that I have purposely tryed, that putting a little Spirit drawn from Niter, (with which Salt the Earth in many places abounds) or a little Oil of Vitriol, upon powder'd Marcasites (which being hard Stones are more difficultly wrought upon, than many other Subterraneous marcasitical Bodies

dies of a looser texture) there presently ensued a strong reaction between the Liquid and the Solid Bodies, whereby was produc'd much heat, not without visible fumes, and Strongly Scented, though not visible, Exhalations. And such kind of Odorous *Effluvia* were emitted, upon the putting a little Spirit of Salt upon our Powder'd Marcasites. And because Sulphur is a mineral that (either pure, or copiously mix'd with others) is to be plentifully met with in the Bowels of the Earth, and in many places burns there, I shall add, that I have found acid Spirit of Sulphur (made the common way) to work sensibly upon marcasitical matter, hard enough coagulated. An experienc'd German Chymist relates, that in some parts of his Country he met with Vitriol Stones, or Marcasites, that, by the action of mere common Water resting a competent time upon them, will grow so hot as to enable the Liquor to retain a
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sensible Heat, when it had pass'd a pretty way from them. And, as I elsewhere shew, that many Accidents may occasion the breaking out of Waters, or the change of their course in Subterranean Places; So, that common Water may produce in a very short time considerable degrees of Heat in Mineral Bodies, may appear by mixing with two or three pounds of fine Powder of common Brimstone a convenient quantity, (for now I remember not well how much I took) of filings of Iron, for this mixture being thoroughly drench'd with common Water, did in a short time grow intensely hot, and send up such a thick Smoke as good quicklime is wont to doe, whilst men Slake it with Water.

It is observable to our present purpose, what account was given me by a Domestick of mine, that liv'd in the North part of England, of a certain Mineral Groove which he had often occasion to resort to: for,
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when I ask'd whether the Damp that place was molested with, did frequently recurr; he answer'd me, that at the time he was there it would annoy the workmen, (if they did not take good care of themselves) more than once in one day. And by Enquiries that I made of others that were conversant in Mines, I learn'd, that in divers places they were molested with Damps, that came not at stated Periods, but irregularly; sometimes with much greater, and sometimes with far lesser, Intervals between them: the times of their duration being also not seldom unequal. So that, supposing such noxious *Effluvia* to be plentifully emitted from the lower parts of the Soil, it need be no wonder, that an *Epidemical* Disease should be rise in this or that particular Town or part of a Country, without spreading much farther; and that it should begin suddenly in places where it was not expected: for, besides that these swarms of *Effluvia*,
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being produc'd by casual concourses of Circumstances, may oftentimes be excited, and invade this or that place, without giving the Inhabitants any warning, besides this, I say, 'tis not always necessary that these noxious *Effluvia* should be generated just under the places they molest, since the motion of the Air, especially when the Wind sits favourably, may suffice to carry them to the Town or other place that feels their ill effects: and yet they may seem to be almost confin'd to those places; sometimes because the neighbouring places are not inhabited enough to make their ill qualities taken notice of; but more frequently because, by being diffus'd thorough a greater tract of Air, they are more and more dispers'd in their passage, and thereby so diluted (if I may so speak) and weakn'd, as not to be able to doe any notorious mischief.

And here I Consider too, that 'tis not always necessary that the harm that is done by these morbid
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Constitutions of the Air, should proceed onely or precisely from these Subterraneal Exhalations we are speaking of, by virtue onely of their own qualities, which they bring with them from under ground. For 'tis very possible, that these *Effluvia* may be in their own nature either innocent enough, or at least not considerably hurtfull, and yet may become very noxious, if they chance to find the Air already imbued with certain Corpuscles fit to associate with them: for, though these sorts of Particles were perhaps neither of them a-part considerably hurtfull, yet there may from their Combinations result Corpuscles, of a new and very morbifick nature.

This may be somewhat illustrated by considering, that the spirituous steams of Salt-peter are not wont sensibly to work on Gold, nor yet the spirituous Parts that the Fire raises from *Sal-armoniack*; and yet when these two sorts of Particles convene, there results from their Coalitions certain

certain Corpuscles of a new nature, that compose the Liquor Chymists call *Aqua Regis*; which by its fretting quality corrodes and dissolves Gold. By Analogy to this we may conceive, that sometimes the Subterranean *Effluvia* may find the Air already impregnated with such Corpuscles, that by associating themselves therewith they may compose Corpuscles far more capable, than themselves were whilst apart, of having ill Effects upon the Mass of Bloud, or some determinate Parts of Humane Bodies, and consequently of producing Diseases there.

And this Instance may appear the more apposite; because it may be said, that, though Silver and Gold, and Diamonds and Rubies, &c. be put together, and *Aqua Regis* be pour'd upon them, it will leave all the rest uncorroded, and fall onely upon the Gold; so the newly produc'd Corpuscles that I have been speaking of, whether breathed in with the Air in Respiration,

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or carried up and down by the Bloud, or other Liquors of the Body, may pass by other parts of it without doing them any sensible harm, and attacking this or that determinate part, produce there some Disease such as the fabrick and situation of that part peculiarly dispose it to be affected with.

And I shall add on this occasion, that in our *Hypothesis* we may render a probable reason, why in some Epidemical Diseases, some persons may escape much better than other, that seem likely to be, at best, as obnoxious to them, without a recourse to the peculiar Constitutions of the Bodies of differing Persons; for it may be conjectur'd, that the noxious Corpuscles that infest the Air, may (especially in windy weather) be very unequally dispers'd through the Air, and many fly in far greater or lesser numbers within equal spaces of Air; and consequently the Persons, that have the ill luck to be in the way of the more
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numerous swarms of morbidick Corpuseles, may be much more prejudiced by them than others, though of weaker constitutions, who happen to be attack'd but by few of them.

On which occasion, I remember, that a great many Trees in some Land that belongs to me, having been suddenly much endamag'd by a wind, that was not able to doe it by it's bare strength; I had the curiosity to view somewhat heedfully a Tree that stood in the Garden, and perceiv'd that all the considerable mischief was done to that side of the Tree, which respected the corner whence the hurtfull Wind blew, the Leaves of the other side continuing fresh and verdant, as being by the other part of the same Tree fence'd from the Wind: and it was farther observ'd, that even the expos'd side of the Tree was not every-where endamag'd; for there were divers parts, where the Leaves continued sound and green, though neighbouring Leaves were some more, some

less (for all that were prejudic'd were not totally) blasted: the sound Leaves and the discolour'd being so odly mingled, that I conjectur'd the cause of the mischief to have been this; that some Arsenical or other corrosive or poisonous Exhalations, being suddenly emitted from the Subterranean parts into the Air, were by the Wind they chance to meet with there, hurry'd along with it, and blown against the Bodies that stood in it's way, moving in the Air, like Hail-shot discharg'd out of a Gun, here in a closer, and there in a more scattering order, so that as more or fewer of them happend to fall upon the same Branch or Lease, they left more, or less marks of their passage, by destroying the texture and colour in the Leaves or parts of them they chanc'd to beat upon. And this may possibly be the cause of some of those sudden and sometimes fatal Effects, that I have known in some places the people talk much of, complaining, that such a one had his
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Eyes, or his Face, or onely one side of it blasted, by a malignant Wind, of which I thought I saw an Example in a Domestick of my own, whilst in such a Wind he was riding after me, who (thanks be to God) had no such mischief done me.

But the Vulgar have entertain'd such strange Conceits and Stories about these Blastings, on which account some of them say that Men are *Planet-struck*, that the fabulous things mingled with those that are possible, have made intelligent Persons reject them all.

One thing more I shall take notice of in favour of our *Hypothesis*, which is, that it well agrees with what has been observed, not without some wonder, of the very short duration of some Epidemical Diseases, in certain Times and Places. For this may proceed from hence, either that all the Morbifick Expirations ascended into the Air almost at once, or at least within a short time, and so were easily spent, that is by diffusion or

dispersion so weakned, as to be disabled from doing much mischief: or else the Subterranean Commotion that produc'd them may pass on from one place to another, and so cease to afford the Air incumbent on the first place, the supplies necessary to keep it impregnated with noxious Exhalations. And it agrees well with this Conjecture, that sometimes we may observe certain Epidemical Diseases to have as it were a progressive Motion, and leaving one Town free pass on to another. Of which some Observations that I have made, encline me to think, that if Physicians would heedfully mind it, they might take notice of several Instances.

One thing more may be added, as consonant to our *Hypothesis*; namely, that sometimes an Epidemical Disease ceases in this or that place, almost as sudden as it invaded, or at least in a much shorter time than Physicians expected. For according to our *Hypothesis* it may well happen, that

that after one sort of Exhalations, whose peculiar Qualities make them Morbifick, have deprav'd the Air incumbent on a particular place; there may by a new or farther Commotion of Subterranean Bodies, be sent up into the Air store of Expirations of another kind, which meeting with those that formerly impregnated it, may either precipitate them, and so free the Air from them; or by other operations on them, and sometimes even by Coalitions with them, so alter their nature as to disable them from doing any farther mischief.

This I shall illustrate, if not confirm, by that very remarkable *Phænomenon* that is yearly observ'd at *Grand Cairo* in *Ægypt*; for, (though I know not whether or no the Corpuscles that produce it arise from under Ground, the affirmative part of the Question being not improbable) it appears, that by the intermixture of adventitious Corpuscles, with the formerly Pestilential Air, 'tis so alter'd and

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corrected, that within one day or two, if not within a lesser compass of time, there is a stop put to the progress of the Plagues; that in that favourable time of year, namely about the middle of Summer, scarce ever misles of raging in that populous City: and, which is more admirable, these sanative Corpuscles (if I may so call them) operate so powerfully, that of those that are already seiz'd by that fatallest of Diseases, the *Plague*, few or none die of it, after once these Antidotal Particles have sufficiently impregnated the Air. I confess so great and sudden a change is very wonderfull, and I should scarce think it credible, if I had not had the means and curiosity to enquire about it of divers persons, some of them very intelligent, that either curiously visited, or also made some considerable stay in, that great City; and found them agree in the main about the truth of the matter of fact; which is much confirm'd to me by so eminent a Testimony as that of the

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learned *Prosper Alpinus*, who for several years practis'd Physick in *Grand Cairo*, and as an Eye-witness delivers what he relates more authentically, as well as more particularly, than any I have met with. And, though he endeavours to give several reasons of this strange and sudden cessation of the malignity of the Plague, yet I doubt they are not sufficient for so wonderfull an effect; unless we take in some new Exhalations, that then impregnate and correct the Air.

And we shall scarce doubt of the great interest these have in the effect produc'd, if we give credit to what the recentest Writer I have met with of Voyages into *Egypt*, has lately publish'd about the annual Pestilence at *Grand Cairo*, a City he much frequented. This Authour, in the account he gives of the present state of *Egypt*, relates that a little after the middle of our *June* (and usually upon the very seventeenth day) there begin to fall towards the last quarter of the night,
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near the morning, certain drops of a kind of Dew, which causes the River to be fruitfull, and purifies the Air from all the Infection of *Camsions*, by which I presume he means the *Pestilence*: for after some lines interpos'd he subjoins, *The Drops or Dew purifies the Air, for as soon as it falls the Plague ceases to be mortal, none dies of it; the Air is wholesome, all Distempers cease, and if any person grows sick, he never dies.*

And then, he adds, *This Dew gives life to every thing; and when it falls upon the Wheat, it causeth it to continue many years without corruption or Worms, and is far more nourishing than that Corn on which it never falls. For this cause they never house the Corn of the Grand Seignior in the Barns, till this Dew is fallen upon it, that it might keep the longer without Worms.*

As well this Conjecture, as some other things deliver'd here and there in this Paper (about the *Salubrity of the Air*,) may probably gain the more

more credit, if I here subjoin what I learn'd by inquiry from a very ingenious Gentleman, who was owner of one or more of the Mines, that afford the *Phænomenon* I am to mention. Which is this, That in the Tin-mine Countreys in *Devonshire*, it sometimes happens, (as perhaps I may have elsewhere noted to another purpose,) that upon a sudden, a Spot of ground, and that not always narrow, will be as 'twere blasted by the ascending hurtfull Fumes; inso-much that not onely the Grass, Fern and other more tender Vegetables, will be turned black, and as it were burnt or scorched up; but now and then Trees also, without excepting Oaks themselves will be blasted and spoil'd by the powerfull Operation of these subtil and poisonous *Effluvia*.

It will probably be here expected, that among the Epidemical Diseases that our *Hypothesis* derives from Subterranean *Effluvia*, I should particularly treat of the cause of *Pestilential*

lential Fevers, and the *Plague* it self. But, though some such *Fevers* may not improbably be in great part imputed to the noxious Expirations of the Globe we inhabit; yet, as to the true *Plague* it self, I freely confess I am at a loss about it's Origine.

The sacred Writings expressly teach, that some *Plagues*, and particularly that which in *David's* time swept away in three days 70000 Persons, have been in an extraordinary manner inflicted by God. And to me it appears either scarce possible, or far more difficult than those that have not attentively enough considered the matter, are wont to think it; To deduce the abstruse Origine, strange Symtomes, and other odd *Phænomena* of some *Plagues* that are recorded in History, from merely Corporeal Causes.

On the other side, it seems unphilosophical, and perhaps rather seems than is very pious, to recur without an absolute necessity to Supernatural

tural Causes, for such Effects as do not manifestly exceed the power of Natural ones: though the particular manner of their being produc'd, is perchance more than we are yet able clearly to explicate. And I think it the more questionable, whether all Plagues are Supernatural Exertions of God's Power and Wrath against the Wicked, because I observe that *Brutes* (which are as well incapable of moral Vice, as moral Vertue) are yet oftentimes subject to *Murrains*, such as may without incongruity be lookt upon as the *Pestilences of Beasts*. And 'tis the less likely, that these sweeping and contagious Maladies should be always sent for the punishment of impious men, because I remember to have read in good Authours, that, as some Plagues destroy'd both Men and Beasts, so some other did peculiarly destroy Brute Animals, of very little consideration or use to Men, as Cats, &c.

Upon these and the like Reasons I have sometimes suspected, that in the Controversie about the Origine of the Plague, namely, Whether, it be Natural, or Supernatural; neither of the contending Parties is altogether in the right: since 'tis very possible, that some Pestilences may not break forth, without an extraordinary, though perhaps not Immediate, interposition of Almighty God, provok'd by the Sins of Men: and yet other Plagues may be produc'd by a Tragical concurrence of merely Natural Causes.

But *though* the difficulties that incumber each of the opposite Opinions, keep me both from Dogmatically asserting, that All Plagues have a Supernatural Origine; and from denying that Any have it: *yet*, to say something on such an occasion, though I can speak but very hesitantly, I shall venture to add, that, whether or no the true Plague be said to descend to the Earth from a higher Sphere than that
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of Nature; yet its Propagation and Effects are (at least for the most part) carry'd on mainly by a malignant disposition in the Air; without which some Plagues could never have been so catching as they were, nor so suddenly mortal; and that in divers Pestilences this malignant Disposition in the Air, may probably be in great part imputed to some kinds of Subterranean Expirations, I am prone to think; and that chiefly upon two Accounts.

The *first* thing that induces me to this Conjecture, is, that not any of the several Causes to which the Plague is wont to be imputed seems to me to be sufficient. Those that fetch it from the malevolent aspects and influence of the Celestial lights, besides that they suppose some things very difficult to be prov'd, have recourse to Agents too remote, too general, and too indeterminate, to be acquiesc'd in as the Causes of such particular Symtomes and *Phænomena*, as oftentimes accompany Pestilences.

And as for those other Sects of Physicians that confidently derive the Plague, some from Internal Putrefaction, and others from excessive Heats, noisome Stinks, Corrupt aliments, and such other Celebrated Causes; though each party alledges plausible Reasons for its own opinion, yet their objections against their adversaries are much stronger than their arguments are for themselves. And the Learned *Diemer-broeck*, though his own Hypothesis seem to be more Theological than Philosophical, has much enervated the Arguments brought for the several opinions lately nam'd, and by him dissented from.

The Reasons he employs to refute all the receiv'd opinions about the Origine of the Plague, except his own, are divers of them worthy of so learned a man; to whom, though I had leisure to transcribe them, I should refer the Curious: my present design being onely to deliver some few things that seem more favourable.

vourable to my Conjectures, than to his Opinion, and were suggested to me, partly by my own Thoughts, and partly by the informations, that, to examine those Thoughts, I procur'd by consulting some uncommon Authours, and asking Questions of great Travellers and Navigatours. By this means I came to learn, that divers great Countries are usually free from the Plague, that according to the vulgar *Hypotheses*, ought to be as much subject to it, if not more, than *England, France, Italy*, and those other parts of *Europe* and *Asia*, where that fatal Disease rages from time to time in the parched Regions of *Africk*, to which the Excessive Heats would make one expect, that the Plagues should make far more frequent visits than to our temperate European Countries; *Leo Africanus* informs us, that some parts are so seldom afflicted with that dreadful Disease, that it usually spares the Inhabitants 29, or 30 years together. And he expressly records, that in *Nu-*

midia it self, (if I much misremember not the Countrey's name, notwithstanding the raging heat of the Climate, *the Plague is wont to be produc'd but once in a hundred years.*

Our * *Purchas* informs us that *in the Land of Negro's* it is not known

* *Purchas's Pilgrimage, lib. 6. cap. 13.*

at all. And to omit what some Travellers and Navigators relate of *Japan*, as if it were seldom or never invaded by the Pestilence; I do not remember that in *New England*, which contains a great extent of Land, though I have had both Curiosity and opportunity to inquire after the Diseases of that Countrey, I ever heard the English take any notice of the Plague, since their settling there above three-score and ten years ago. And as for the *East Indies*, Sir *Philibert Vernatti*, a *Virtuoso* of great fame and authority at *Batavia* where he resides, in his ingenious Returns to the Queries sent him by the *Royal Society (of Naturalists)* answers thus to the fifteenth.

teenth. [*Pestis morbus est Indiarum Incolis incognitus*] The Plague is a Disease unknown amongst the Indians. And of the Countries that lie yet more remote, as the great Empire of China, and the Kingdoms of Tunquin, and of Cochinchina, that great Traveller Alexander de Rhodes, who spent 30 years in those parts, affirms, that the Plague is not so much as spoken of there. And yet the same Jesuit does, upon grounds probable enough, estimate the number of the people of China alone to be two hundred and fifty millions; [a number I take to exceed by far that of all the Nations of Europe.] Now when I consider, how vast Tracts of Land are compriz'd in those Countries, some of which the Plague does not at all, and others but exceeding unfrequently, invade; this Immunity seems to me very unfavourable to most, if not all, the opinions receiv'd among Physicians, as also that of Diemerbroeck himself who derives the Plague from a Supernatural Cause,
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the wrath of God against the sins of men. For in Regions of such extent, and divers of them very populous, which are seated under very differing Climats, and which are some of them inhabited by Nations, that make war with numerous Armies, fight bloody battels, leave heaps of unbury'd Bodies expos'd to the putrefying heat of the Sun ; are sometimes forc'd, as well as others to live upon very unwonted and unwholsome foods ; that worship stocks and stones, and beasts, and some of them Devils, whom they know to be such ; that are at least as guilty as Europeans, of Assassins, Poisonings, Rapes, Oppression, Sodomy, and other crying Sins : in these Regions, I say, 'tis not imaginable but that great Intemperatures of the Air, especially, in point of Heat, Stench of dead Bodies kill'd in fights, unwholsomeness of Aliments, malevolent aspects of Celestial Bodies, high provocations of the divine Justice, and in short, all the Causes, to one or other of which the several

ral parties of Physicians are wont to refer the Plague, should be wanting any more than in our *Europe*; and yet the Plague which is presum'd to be the Effect of one or other of those Causes, is not here observed to be produc'd.

I know that it may be said, that the Historical things I have been reciting, do not onely oppugn the several receiv'd Opinions of Physicians about the cause of the Plague, but disfavour my Conjectures too. But if this be said, I desire it may also be consider'd, that my Judgment about the Plague consists of two Parts; *One*, that 'tis exceeding difficult to assign the true and adequate Cause of the Origine of the Pestilence; and the *Other*, that whatever be the Cause of its First Eruption, its Propagation and divers of its Symptoms, may be probably enough refer'd to the depravation of the Air by Subterranean Steams, and their Effects. If this be duly consider'd the Historical Observations will

will appear not to overthrow the *First* member of our Hypothesis, but rather to confirm it: and 'tis upon this account that I have mention'd them in this place. And as to the *Second* member it may be said, that since in the East *Indies* and the other Countries, I have nam'd, as privileg'd from this raging Disease, it is not observ'd to break out: as it cannot be said that Subterranean *Effluvia* do in those Countries promote the Propagation of it; so it cannot be prov'd that they could not doe it, in case the Plague were begun by other Causes. But in regard I think it not improbable that sometimes the Plague is not onely fomented but begun by noxious Expirations of the Terrestrial Globe, I shall add that this supposition, though I confess it be somewhat disfavour'd by some of the lately mention'd Observations, yet is not absolutely inconsistent with them. For First, it may be said that some of the Countries I speak of, may be destitute of
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those noxious minerals to which we impute some Plagues, it holding true in Minerals as well as in Plants. *Non omnis fert omnia tellus*, and to omit what I have not without some wonders observ'd, of the Limits of differing sorts of Mines and Mineral Veins in very bordering parts of the same tract of Land, I cannot but here take notice, that though Sulphur be in many Countries usually found, and that in plenty where there are other Metalline Veins, in-somuch that Chymists make it one of the three Principles of all Metals, yet in the Mines of *England* more strictly so call'd, I do not remember I ever met with so much as an Ounce of Native Sulphur, and I could not find by divers Mineralists, of whom I purposely ask'd the question that they had met with any among the various Mines they had frequented. It may also happen that there may be hurtfull Minerals in a Countrey, and yet not capable of often producing or promoting Pestilences there,

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there, even upon moderate Earth-quakes. For 'tis possible that these Orpimental or other Noxious Minerals may have their Beds or Veins lying so deep in the Earth, that they are not ordinarily able to send up *Effluvia*, strong and copious enough to make a Pestilential depravation of the Air, and even in lesser Earth-quakes the commotion or agitation of the ground, especially if the Earth-quakes proceed (as one may suspect that divers of them do) from the sudden fall of ponderous Masses in the hollow parts of the Earth and the shakings of the ground thereby produc'd, and sometimes spreading far, may not reach so far downwards as much to affect these very deep Mines, and yet some other more violent Earthquakes, may affect even these; upon which ground one may give some tolerable account why the Plague in some parts of *Africk* has been observ'd to rage but once in thirty or once in an hundred years; for there may be periodical

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Paroxysms, if I may so call them, or grand and vehement Commotions in Subterranean Parts, though men have not yet, for want of sufficient Longevity or Curiosity observ'd them. On which occasion, I remember that a late judicious French Historian recounts that in part of the last age, and part of this, a very pernicious Disease of the nature of a Colick raign'd in *France* every tenth year for a long tract of time.

And the Experienc'd * *Platerus* relates, that at *Basil*, ^{* Lib. 2. P. M. 323.} where with great success

he practis'd Physick fifty six years, the City was afflicted with furious Plagues once about every tenth year for seventy years together, of each of which Pestilences he gives a particular account in his usefull observation. It may also farther be said, that those Exhalations in the East *Indies*, &c. that would otherwise be pestiferous, may be corrected by other Expirations that may be either of benign nature, or of such a nature

ture, as though noxious in themselves, may fit them by combining with those that would be pestiferous to disable them to be so, as I elsewhere observ'd out of *Beguinus*, that a Countrey abounding in veins and masses of Cinnabar, which is the Ore of Quicksilver, was preserv'd from the Plague, when the neighbouring Regions were wasted by it; and I shall illustrate this matter somewhat farther by taking notice, that though Corrosive Sublimate be so mischievous a Mineral Composition, that a few grains may kill a man, yet the fumes of this combin'd with those of *Crude*, common Quicksilver, which are themselves unwholesome enough, make *Mercurius dulcis*, which is a mixture so innocent, that being well prepar'd, and well administred, it is both safely and usefully given even to Children.

If what has been said will not suffice, I shall propose another possible way of accounting for the immunity of some Countries from the
Plague.

Plague. For one may conceive that in such Regions the Soil, and other assisting Causes may constantly produce in the Air such a Constitution as is found in the Air of *Egypt*, during the time of the increase, and overflowing of *Nile*, which usually lasts every year for several weeks, for during this time the Air is so antipestilential, that not only the Plague does not make a new Eruption; but is either wonderfully check'd or quite suppress'd in those houses that it has already invaded, so that its mortal infection reaches no farther, and that it may not be thought incredible that some Countries may have, if I may so speak, an antidotal Nature, in reference to some pernicious Evils, I shall represent that there are some whole Countries which are privileg'd from producing Vipers, Toads, and other venomous Creatures, as is vulgarly known concerning *Ireland*, where I could never see any such, nor find by Enquiry of either the Natives, or English In-

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habitants, that they had met with any in that Kingdom, where 'tis an uncontroll'd tradition, that if Poysonous Creatures have been carefully brought there from other Parts, they have died almost as soon as they came thither. There are some other Islands to which a like hostility to venomous Animals is ascrib'd: and as it seems not impossible that some Countries should have a Soil that so impregnates the Air as to make it suppress or quite enervate many differing sorts of Poysons, so others may by their Constitution be qualify'd to master or resist poisonous Expirations or wandering Corpuscles that elsewhere are wont to produce the Plague. And this may suffice for the first thing whereon we ground our Hypothesis.

The Second thing that invited me to the above propos'd Suspicion or Conjecture, is, That it affords a not improbable account of some considerable things, relating to the Pro-

Production and *Phænomena* of the
Plague.

(1.) As *First*, 'tis observ'd that sometimes the Plague breaks out, when there has not preceded any such immoderate distemper of the Air, or any casual Enormity capable of producing so great and anomalous an Effect. Nay, which is more, it has been observ'd, that very great and unusual intemperatenesses of the Air have several times happen'd, and divers notable and threatening Aspects of the Stars have been noted by good Writers without being follow'd by the Plague. The

celebrated * *Fernelius* re-
lates, that near the time
he writ this Observation,

* *De abditis
rerum caus.
lib. 2. c. 13.*

that Year, which of all those that had pass'd in the memory of Man, was all the World over the most immoderately hot, and was yet most healthfull. And the same Authour reports the Plague to have begun in the midst of Winter, and to have gone off in Summer, and that several

ral times ardent Summers have been altogether free from the Plague: which I also have noted to be true. *Johannes Morellus* observes, that in his Countrey after a dry Winter, and wherein the North Wind reign'd, though it were succeeded by a most temperate and healthfull Spring, yet this brought in the Plague, and that, when the North Wind was predominant and the Air pure and sincere. Which I the less scruple to believe, because I observ'd something very like it in the Constitutions of the Air, that preceded and accompany'd the dreadfull *London* Plague that broke out in the year 1665. Which *Phænomena* much disfavours their Opinion that impute the Plague to the excesses of the manifest Qualities of the Air; but are agreeable to our *Hypothesis*, since by what has been formerly deliver'd, we may gather that Noxious Subterranean Fumes may be suddenly, and without any warning belch'd up into the Air, and, by depraving it, produce fatal

fatal Diseases in many of those that are constantly surrounded by it, and draw it in, almost every moment, with their breath.

Of the deadly Hurtfulness of divers Subterranean Expirations, at their first Eruption, there are many Histories extant in approv'd Authors: And we have observ'd Instances of that sort, in the Times and Countries we live in. But, because all Poisonous, and even mortal, Exhalations are not therefore truly Pestiferous, but may, like many other Poisons, kill the Persons they immediately invade, without qualifying them to infect others; I shall add a Passage out of that Excellent Historian "*Monsieur de Mezeray* who relates in the life of *Philip de Valois*, that the Plague that happened in *France* in the Year 1346. was so contagious and destructive, that scarce a Village, or even a House, escap'd uninfected by it. He adds, that this Pestilence, than which none had been observ'd more furi-

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 fatal

fatal Diseases in many of those that are constantly surrounded by it, and draw it in, almost every moment, with their breath.

Of the deadly Hurtfulness of divers Subterranean Expirations, at their first Eruption, there are many Histories extant in approv'd Authours: And we have observ'd Instances of that sort, in the Times and Countries we live in. But, because all Poisonous, and even mortal, Exhalations are not therefore truly Pestiferous, but may, like many other Poisons, kill the Persons they immediately invade, without qualifying them to infect others; I shall add a Passage out of that Excellent Historian "*Monsieur de Mezeray* who relates in the life of *Philip de Valois*, that the Plague that happened "in *France* in the Year 1346. was "so contagious and destructive, that "scarce a Village, or even a House, "escap'd uninfected by it. He adds, "that this Pestilence, than which "none had been observ'd more furi-

"ous and spreading, began two years
 "before in the Kingdom of *Cathay*, by
 "a vapour that was most horribly stin-
 "king, which brake out of the Earth
 "like a kind of Subterranean fire, con-
 "sum'd and devour'd above 200
 "Leagues of that Countrey, even
 "to the very Trees and Stones, and
 "infected the Air in a wonderfull
 "manner. *From Cathay*, say's he,
 "*it pass'd into Asia and Greece, thence*
 "*into Africk, afterwards into Europe,*
 "*which it ransack'd throughout.* O-
 ther Instances, of Pestilences begun
 by noxious Subterranean Fumes, I
 have met with in good Au-
 thours; but cannot now re-
 call the Particulars to mind,
 and therefore shall pass on
 to the second Observation.

See *Diemer-
 broeck de
 Peste, lib. 1.
 cap. 8.*

(2.) In the next place then ;
 whereas 'tis noted by diligent Obser-
 vers, that there is a wonderfull di-
 versity in several Countries, and
 even in the same Countrey at several
 distant times, of those raging Dis-
 eases, that Physicians agree in calling
 the

the Plague, (whence it happens that such Medicins or Methods of curing as are in one Plague succesfull, as Phlebotomy, Purging, &c. do oftentimes in another prove dangerous, if not mortal) whereas (I say) this great variety has been observ'd in Plagues; it may be fairly accounted for, by the great number and diversity that has been actually found, or may be reasonably suppos'd, in the numerous Minerals, and other Bodies that nature has lay'd up in the Subterranean Regions: especially if we consider, that the number of such Bodies may be much increas'd and diversified, by the various combinations which may be made of them, not onely by casualties, but by the action of Subterranean Fires, and *estuaries*, and *menstruums*, such as I have elsewhere shewn to be lodg'd beneath the turf or *superficies* of the Earth. And the ascending Corpuscles of those Mineral Bodies, being most of them solid and subtile, may produce in the Bloud;

and so in the Body, far more odd, and violent Symtomes, than the peccant Humours that use to beget ordinary Diseases. Which may be one reason, and perhaps the chief, why the ancient Heathens, and *Hippocrates* himself, acknowledg'd in Pestilential Diseases *Δειον τι*, somewhat of Divine, surpassing ordinary Nature.

What these Mineral Substances are, whose steams produce such odd and dismal Symtomes, I think exceeding hard to determine. Yet, if I were to name *one* sort, I should perhaps think the least unlikely to be Orpiment. For, of the Poysonous Minerals we are acquainted with, I know not any of which there is greater quantity in the Bowels of the Earth; especially taking that name, in the latitude allowed it, by those skilfull men, that make three sorts of it, *viz.* Yellow, Red and White Orpiment, divers of whose mischievous Effects seem to agree well enough with the Symtomes of some Plagues,
and

and may be guessed to have at least a considerable interest in the production of them. But yet, to speak candidly, I do not think that these Minerals are the causes, even of all those Pestilences whose efficient may come from under the Ground: For several reasons, and some drawn from Experience, make me think that the Subterranean Regions have many kinds of very mischievous fossiles, of which Physicians, and even Chymists, have no knowledge, and for which they have not any distinct names; and that the various associations of these, which Nature may by Fire and *menstruums* make under Ground, and perhaps in the Air it self; may very much increase the number, and variety of hurtfull Matters, and also heighten their hostility to Humane Bodies: as I think may be argued from the factitious White Arsenick that is commonly sold in Shops, which though usually made of Orpiment, by the addition of so innocent a Body as com-

common Salt, (which is found in great plenty under Ground,) is observ'd to be far more poysonous than Orpiment it self. And I remember that a skilfull Chymist, having in my presence tasted some prepar'd, and, as was thought, somewhat corrected Arcenick ; was quickly invaded by such Symtomes, as he thought would presently kill him. But, through God's blessing, I quickly put him out of danger, though not out of pain, by early prescribing him store of Oil of sweet Almonds, and something made of Lemmons, that I chanc'd to have by me : But to return to what I was saying ; Sandarach seems to be, but Orpiment whose yellow Colour is deepn'd to Redness: and native Arsenick, (for I have seen such a thing, though it rarely comes into *England*,) seems to be little other than pale or white Orpiment. And indeed in *Hungary*, all three may be found not far from one another in the same Mine ; As I learn'd by Inquiry from an observing

ving Eye-witness, by whose means, and of another Chymist, divers Native Orpimental Minerals (to say nothing of Realgar) because it is a Factitious combination of Orpiment and Sulphur, came to my hands. And as this sort of Fossiles comprizes more numerous and various ones, than is vulgarly noted, so the very noxious effects of the *Effluvia* of Orpiment, are not unknown to divers Physicians: and the Learned *Sennertus* gives a particular instance of it in a Painter, who upon opening a Box where Orpiment, which men of his Profession use as a Pigment, had been long kept, had his face all swell'd, and was cast into fainting Fits. And as White Arsenick is of a more piercing and corrosive nature, so it were not difficult to shew out of the Writings of eminent Physicians that *its effects have* divers times proved very hurtfull, and sometimes mortal. When but externally worn in Amulets, especially if the Pores

Senn. M.
P. E. vi.
p. 66.
of

of the Skin were open by exercise and sweat ; and the nature of the Symptomes produced seems to confirm our Hypothesis, since the Persons that wore these Arsenical Amulets were affected, some with great anxieties about the Heart, some with inflammation, some with burning Fevers, some with exulceration of the Breasts, so some with Pusles like those of the Plague, and these were sometimes black, as if made with a Caustick : most Patients were affected with great weakness and faintness, &c. as if they had swallowed Poison ; and of one young Man 'tis recorded, that having heated himself in a Tennis-court with an Amulet upon his Breast, the virulence of its Corpuscles made him fall down stark dead upon the Spot. And 'tis a considerable Circumstance in these Observations, that several Patients were cur'd of the Symptomes that seem'd to be Pestilential ones by the same Remedies that are Alexipharmacal against

against the Plague, whence it may also be made probable, that the Plague it self many times is a natural, though a dreadfull and anomalous Disease, since its Effects and Symptomes so much resemble those of acknowledg'd Poisons, and have been cur'd by Antidotes effectual against other Poisons.

I have not time to mention what I have my self try'd and observ'd about the bad effects of Orpiment, and its kinds. But I remember, that enquiring of an ingenious Man, who sometimes visited a Mine which was known to abound with Orpimental Fossils; he answer'd me, that when he walked over the neighbouring Grounds, he found himself much disorder'd, especially in his *Thorax* by the *Effluvia*, and that the Mine-men and Diggers were subject to a malignant anomalous and dangerous sort of Fevers, though he said he was apt to impute, I know not how truly, some part of their obnoxiousness
to

to it, to their drinking too much strong Wine. But though 'tis probable the *Effluvia* of Orpimental Bodies may have a great interest in several Plagues, yet, I strongly suspect that many others may proceed from the steams of such Subterranean Bodies as are not yet distinctly known to us; and possibly have their *Effluvia* variously combin'd, either beneath or *above* the surface of the Earth. I say *above*; because I have several times, and that without heat, combin'd separately invisible fumes of differing kinds, into manifestly visible ones in the free and open Air.

And that the Subterranean *Effluvia* may produce effects, and therefore probably be of natures, very uncommon, irregular, and if I may so speak, extravagant, may appear in those prodigious Crosses that were seen in our time, *viz.* in the Year 1660. in the Kingdom of *Naples*, after an eruption of the fiery Mountain *Vesuvius*: of which Prodigies

digies the Learned *Kircherus* has given an account in a particular *Diatrise*. For these Crosses were seen on Linen Garments, as Shirt-sleeves, Womens Aprons, that had lain open to the Air, and upon the expos'd parts of Sheets; which is the less to be admired, because as *Kircher* fairly guesses, the mineral vapours were by the texture that belongs to Linen [which consists of threads crossing one another for the most part at or near right Angles] easily determin'd to run along in almost streight lines, crossing each other, and consequently to frame Spots resembling some one, and some another kind of Crosses. These were extremely *numerous* in several Parts of the Kingdom of *Naples*: in-somuch that the Jesuit that sent the Relation to *Kircher* says that he himself found thirty in one Altar-cloth, that fifteen were found upon the Smock-sleeve of a Woman, and that he reckoned eight in a Boy's Band: also their colour and magnitude were

were very unequal, and their *figures* discrepant, as may appear in many Pictures of them drawn by the Relatour : they would not wash out with simple water, but requir'd Soap ; their *duration* was also unequal, some lasting ten or fifteen days, and others longer before they disappear'd. And these Crosses were found not onely upon Linen Garments expos'd to the Air, but upon some of those (belonging to Altars) that were kept lock'd up in Chests (to which possibly they might have access by the Key-holes, or some unheeded chinck.) To which strange *Phænomena* if I had the leisure to add some others that I have met with in *Agricola*, and other approved Authours, whose Relations my memory doth not now serve me particularly to cite ; I presume it would appear yet more probable that Subterranean *Effluvia* may now and then be of a very Anomalous nature, and produce strange effects, and among them
variety

variety of Pestiferous ones in the Air.

But, to add this upon the bye: though I fear Physicians will not be able to discover *all* the subterranean Bodies whose *Effluvia* produce or contribute to the Plague: yet I do not think it impossible that by diligent observations and trials, sagacious Men may discover *divers* of them; and perhaps Antidotes against them.

And though the business of this Paper be to treat of the Causes, not the Remedies of the Plague; yet I love Mankind too well, to suppress on this occasion an Observation, that, by God's blessing, may in some cases, save the lives of many. In the late great Plague that swept away so many thousands at *London*, there staid in the City an Ingenious Physician, that was bred by the Learned *Diemerbroeck*, (whose Book *De Peste*, I prefer to any I have yet read of that Disease.) This Doctour (whose name I am

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sorry

sorry I have forgotten) hearing that I was desirous to receive an account of the Plague from some intelligent Eye-witness, and having soon after some occasion to pass near the Place in the Countrey where I then resided, was pleas'd to give me a visit, and a rational account of the main things I desired to know ; and when I inquired about his method of Cure, after he had told me that he had twice had the Plague himself, whereof he shewed me some effects ; he added, that after many and various trials, he perceiv'd that abundance of his Patients died, after the Bubos, (Carbuncles) or Pestilential Tumours appear'd ; because upon a little refrigeration of the Body by the Air, and oftentimes by the very fear that disheartened the Patient, the Tumours would suddenly subside, and the Pestilential Matter recoiling upon the Vital Parts, would quickly dispatch the fatal work. Wherefore he bethought himself of
a me-

a method, by means of which he assur'd me, he had not lost one Patient of very many he treated ; if he could but, as he usually did, by good *Alexipharmical*, and Cordial Remedies, enable and excite Nature to expell the peccant Matter into a Tumour ; for then he presently clapp'd on an appropriated drawing Plaster, which would never suffer the Tumour to subside ; but break it, or make it fit for opening, and thereby give Nature a convenient vent, at which to discharge the matter that oppress'd her. This Plaster 'twill easily be thought I was desirous to know ; and he told me 'twas a Chymical one, and that 'twas no other than the *Magnes Arsenicalis* of *Angelus sala*, whose description, because the Book wherein 'tis found, is in few hands, I have here annext. If this prove as successfull in other Plagues, as it did to those that us'd it in that of *London* ; there will be just cause to admire and praise the benignity of Divine

Providence, which in a poisonous Mineral, that probably does oftentimes concur to produce the Plague, has laid up a remedy for it.

Emplastrum attractivum Pestilientiale nostrum.

℞ Gummi Sagapeni, Ammoniacy, Galbani an. ℥iii. Terebinthinae coctæ, cereæ virginis ana ℥ivß. Magnetis Arsenicalis subtiliter pulverisati ℥ii. radic' Aronis pulverisat' ℥i. Gummi depurentur cum aceto scyllitico, & ad consistentiam Emplastri coquantur, & postea ponderentur, deinde cum rebus aliis fiat Emplastrum lege artis, hoc Emplastro Carbunculus obducatur, quod paucis horis venenum extrahit.

Præparatio Magnetis Arsenicalis antea dicti.

℞ Arsenici ChrySTALLINI, sulphuris vitri, antimonii crudi ana, hæc tria in mortario ferreo pulveriscentur, in vase fortis-

vivi

*fortissimo vitreo, ponantur ad ignem
arenæ donec vitrum optimè incalcescat,
& prædicta solvantur & liquentur
instar picis, quod observabitur quan-
do filum quoddam immittitur in fun-
dum quod extractum postea instar Te-
rebinthinæ trahetur ubi satis coctum
erit, postea remove vitrum ab igne, &
ubi refrigeratum est rumpe, & subti-
liter pulverisa, & ad usum serva.*

By the same motive (*Philanthro-
py*) I am induc'd to add on this oc-
casion, that having had some op-
portunity to oblige an ancient and
very experienc'd, Physician, to
whose care was committed a great
Pesthouse, where the Contagion
was so strong, that he lost three
Physicians that were to be Affi-
stants to him, and three Chirur-
geons of four that were to be sub-
servient to him; I desir'd to learn
of him, if he counted it not too
great a secret, what Antidote he
us'd to preserve himself from so vio-
lent and fatal an Infection. This re-

quest he readily granted, but with-
all told me, that his method would
not seem to me worth mentioning,
if I were one that valu'd Medicines
by their Pompousness, not their U-
tility. For, besides ardent Prayers
to God, and a very regular Diet,
his constant Antidote was onely, to
take every Morning fasting a little
Sea-salt dissolv'd in a few Spoonfulls
of fair Water ; which he made
choice of, both because it kept his
Body soluble without purging or
weakening it, and for other Reasons
which I must not now stay to set
down. I know this Medicine may
appear a despicable one ; but yet in
my Opinion it ought not to be de-
spis'd, after such Experience as I
have related has recommended it.
For I think it desirable, that notice
be taken of all Remedies, that have
been found by good Trials, not
bare Conjectures or uncertain Re-
ports, available against the Plague.
For, since Pestilences, as we have
lately noted, are exceeding various
in

in their kinds, 'tis very possible, and not unlikely, that their Appropriated Remedies may be so too. And therefore I would not easily lay aside every Medicine, that this or that Learned Physician may speak slightly of, or even may declare that he has found it unsuccessful against the Plague; since the same Medicine may be available in a Pestilence of another kind, in which perhaps the Remedies commended by the Physician we speak of, will be found inefficacious.

This Consideration forbids me to pass by what happen'd to me in the great *London* Plague above-mention'd; namely, that a very Learned Physician having once recommended to me an Herb little noted in *England*, as a most effectual and experienced Antidote against the Plague, I caus'd it to be cultivated in a Garden (as I still do every year;) and when the Pestilence rag'd most, having some of it by me, made up with a little Sugar in the

form of a fine green Conserve, I sent it to two infected Persons, who, by the Divine Benediction on it, both of them recover'd. But having made but those two Trials, I dare not ground much upon them onely; though I usually keep the Plant growing in a Garden, partly because both the Taste and Colour; one or other of which in most Antidotes is offensive, are in this pleasant; and partly because some little Experience has invited me to believe the Commendations that I have found given of it, against the Bitings of venomous Creatures: whereof I remember a notable Instance is recorded by *Petrus Spehrerius* of a Roman, who having with his Staff pierc'd or crush'd a Viper, that he took to be dead, had so strong a Venom transmitted along the Staff, that the ensuing Night he had a very great Inflammation in both his Lips, to which

*In Observat. nobil. apud Schenkium, l. 7.
Observ. Med.
Tit. de venenis
ex animalibus.*

which superven'd an exceeding Ardent Fever and strange Tortures; from all which *Serianus Pacyonius*, a noted Physician that was call'd to him, free'd him as it were by Miracle, by the Juice of *Goats-rue*, or as others call it *Galega*, that grew copiously in that Place. It may without disgust be taken somewhat plentifully, (and so it ought to be) in its entire substance as a Salad; or else one may give its Conserve, its Syrup, or, which is better, its Juice newly express'd.

(3.) It likewise agrees with our *Hypothesis*; that sometimes the Plague ceases, or at least very notably abates of its Infectiousness and Malignity, in far less time than according to the wonted course of that ravenous Disease, Physicians did, or rationally could expect. For sometimes it may happen, that, though the Temperature or Intemperateness of the Air continues the same, the matter that afforded the Pestiferous Exhalations may be either

ther spent under ground, or so alter'd by combination with other subterranean Bodies, or by some of those many Accidents that may happen, altogether unknown to us, in those deep and dark Recesses. And if once the Fountain of these noxious *Effluvia* be stopt, so that those that are in the Air cease to be recruited, the Wind and other causes may in a short time dissipate them, or at least dilute them with innocent Air, so far, as to keep the Disease they produc'd from being any thing near so mischievous as before. And here I consider, that it may several times happen, that, though the Minerals that emit the hurtfull Expirations, remain where they were under ground, and be not considerably wasted, yet their fatal Effects may not be lasting, because the *Effluvia* were generated by the conflict of two or more of them, which vehemently agitated one another, and sent up fumes, which ceas'd to ascend, at least in great plenty, when
the

the Conflict and Agitation ceas'd. As, I have try'd that by putting good Spirit of Salt upon Filings of Steel or Iron in a conveniently shap'd Glas, there will be made a great conflict between them, and without the help of external Heat, there will be sent up into the Air store of visible Fumes of a very Sulphureous Odour, and easily inflammable, which copious elevation of Fumes will lessen or cease, as does the tumultuous agitation that produc'd them. And so likewise, if you pour *Aqua fortis* upon a convenient proportion of Salt of Tartar, there will be at first a great ebullition produc'd, and, whilst that continues, store of red and noisome Fumes will be elevated, but will not long outlast the commotion of the mixture, whose active parts will in no long time combine into a kind of nitrous Salt, wherein the noxious parts of the *Menstruum* are as it were pinion'd, and hinder'd from evaporating or ascending, though really they

they retain much of their pristine nature, as I elsewhere shew.

It may also happen, that soon after that commotion of subterranean Matter, which sent forth pestiferous Exhalations, a more intense degree of subterranean Heat, or perhaps the same latent Fire, extending it self farther and farther, may force up Fumes of another sort, that being of a contrary nature, may be, if I may so speak, antidotal against the former; and by precipitating them, or combining with them, may disable them from acting so mischievously as otherwise they would. To countenance which I shall tell you, that I have sometimes purposely made Distillations, in which one part of the Matter being, after the operation ended, put to the other, there will ensue a sudden and manifest conflict between them, and sometimes an intense degree of Heat. And that mineral Exhalations, though otherwise not wholesome, may disable pestiferous *Effluvia,*

via, may be gather'd from what I lately noted about a Countrey, which abounding with veins of Cinabar, was, probably by their expirations, preserved from the Pestilence. And our *Hypothesis* will perhaps appear somewhat the more probable, if we reflect on what I lately mention'd of the sudden check, that is almost every Summer given to the Plague, which at that time is wont to reign at *Grand Cairo*. For since 'tis generally observ'd and complain'd of, that *Morbifick* Causes doe their work much more effectually than *Sanative* ones. It seems very probable that Exhalations ascending from under-ground into the Atmosphere, may be capable of producing pestilential Fevers, and the Plague it self, since those Corpuscles that impregnate the *Egyptian* Air upon the swelling of the Nile, are able to put a speedy stop, not only to the contagiousness, but to the malignity of the Plague, even when 'tis assisted by the Summer Heat,

Heat, which at *Grand Cairo* is wont to be excessive.

But having insisted perhaps too long on this *Egyptian* Pestilence, I shall onely add, by way of Illustration of the Conjecture that invited me to mention it, that the accession even of Expirations that are not themselves wholesome, may sometimes serve to correct the Air, and put a sudden check to an Epidemical Disease. For Corpuscles of differing kinds may by their Coalitions acquire new Qualities, and each sort of them lose some of those they had before : as, suppose there wander'd in the Air a great many *Effluvia*, which by their determinate shape and bulk were apt to corrode or irritate the Lungs, or the Membranes of the Brain, &c. as those of Nitre are to corrode Silver ; it may happen that another sort of Reeks, though in their own nature unwholesome, may, by associating themselves with the first sort, and composing with them Corpuscles of
new

new qualities, abolish or much weaken the noxious ones they had before, in reference to this or that part of the Humane Body. Though the Spirits of Salt-peter will readily corrode Silver, yet if you add to them (as for some purposes I am wont to do) about half as much or less of the spirituous Particles of common Salt, (which yet are corrosive enough, and will fret asunder the parts of Iron, Copper, Antimony, &c.) there will emerge a Body that will not at all corrode pure Silver.

H

PRO-

PROPOSITION IV.

It is very probable, that most of the Diseases that even Physicians call New ones, are caus'd either chiefly or concurrently by Subterranean Steams.

THE Product of my first Endeavours to bring credit to the foregoing Proposition, appearing to have miscarry'd, when I came to send to the Press the things I had written about it; that at least what can be preserv'd of it may not be lost, I shall substitute in stead of it the following Account.

At the entrance of my Discourse I observ'd that the Term *new Disease* was much abused by the Vulgar, who are wont to give that Title to almost every Fever, that, in Autumn especially, varies a little in its Symptoms, or other Circumstances, from the Fevers of the foregoing Year

Year or Season. And therefore I declared, that by *new Diseases* I meant onely such, whose Symptoms were so uncommon, that Physicians themselves judged them to deserve that appellation; Such, for instance, as the *Sudor Anglicus* or Sweating Sickness; that Disease which the learned *Wierus* and others call in Dutch *Die Varen*; an unheard-of Disease describ'd by *Ronseius*, that in the Year 1581 invaded and destroy'd many in the Dukedom of *Lunenburg*; to which many Physicians add the Rickets, and others generally the *Lues Venerea*. Having clear'd the Terms, I next consider'd whether there were really any *new Diseases* properly so call'd, and gave some reasons to suspect that some Diseases, which among Physicians themselves have pass'd for *New*, were extant before *in rerum natura*, though not in the Countrey wherein even the learned judg'd them to be new. And I intimated, that to examine this Suspicion thoroughly, 'tis not safe

to acquiesce in the Books of Physicians onely; but 'tis fit to consult the Writings of Geographers, whether *ancient* (among whom I particularly recommended *Strabo*) or *Modern*, together with the Relations of Historians, Navigators and other Travellers. And here I inquired, without determining any thing, whether the *Lues Venerea* be, as most Physicians are wont to suppose a Disease wholly new, or onely new to our European World, and brought hither from some African or other remote Region, where it may be probably suspected to have long been Endemical.

But taking it for granted, with the generality of Physicians, that some new Diseases are to be admitted; I advanced to consider some of the Causes, to which they may be imputed; And to give some reasons, why I do'nt acquiesce in their Opinion, though very general, that derive them onely or chiefly from the varying influences of the Heavenly Bodies.

Bodies. For the most powerfull of those, namely the Sun and Moon, act in too general and indeterminate away, to afford a sufficient account of this affair. And as for the other Lights, the fixt Stars, besides their being universal and indefinite agents, their scarce measurable remoteness makes it justly questionable, whether they have any sensible Operation upon any part of our Bodies, save our Eyes. And, *though* I deny not that great intemperateness of the Air, as to the four first Qualities, as Heat, Cold, Driness and Moisture, are wont (not over justly) to be call'd, may dispose mens Bodies to several great Distempers, and may also be concurrent causes of those we are speaking of: yet neither can I acquiesce in these, when I consider how much more frequently they happen, than new Diseases do; and that their action, though various, is too general and indeterminate to perswade me, that they can be the adequate causes of effects so rare and

anomalous, as Diseases odd enough to deserve the Title of new.

But now; the Subterranean Region of our Globe, besides that it is always near us, abounds with variety of noxious Minerals, and probably conceals great quantities of differing sorts of them, that are yet unknown to us. And

*A Discourse
of Subterranean
Streams as they
affect the Air.*

since we have elsewhere proved, that there want not causes in the Bowels of the Earth, to make great and irregular, and Sometimes sudden Confluxes, Conflicts, Diffipations, and other considerable Changes, amongst the Materials, that nature has plentifully treasured up in those her secret Magazins. And since, in making out the three former Propositions, we have manifested, that the Subterranean parts of the Globe we inhabit, may plentifully send up Noxious *Effluvia* of several kinds into the Air; it ought not to seem improbable that among this Emergent variety of Exotick and hurtfull Steams,

Steams, some may be found capable
 to disaffect Humane Bodies, after
 a very uncommon way, and thereby
 to produce *new Diseases*; whose du-
 ration may be greater or smaller, ac-
 cording to the lastingness of those
 Subterranean causes, that produce
 them. On which account it need
 be no wonder, that some new Dis-
 eases have but a short duration, and
 vanish not long after, there appear-
 ing the Source or *Fomes* of the Mor-
 bifick *Effluvia*, being soon destroy'd,
 or spent: whereas some others may
 continue longer upon the Stage, as
 having under ground more settled
 and durable causes to maintain them,
 Which last part of the Observation
 may be illustrated by what happen'd
 in *Calabria*; which Province, though
 it have been observed to have acqui-
 red, within these two or three ages,
 the faculty of produ-
 cing *Manna* upon cer-
 tain Trees*; yet this
 great change, though
 sudden enough, had

* C. Magnenus de
Manna, cap. 9. *Dis-*
amabo, Altomari, cur
 ante trecentos annos
 nullum *Manna* fuit
 in Oenotria; jam cer-

*se aderant Pagi ibi-
dem urbesque vicinae
neque sese lisset curio-
san Incolarum soler-
tiam. C. 13. ante
240. annos nullum
Manna Calabriensis
in Auloribus vestigi-
um est.*

it seems such stable
causes, as well as of
great extent, that it
hath lasted several
scores of years, and
continues in that
Countrey to this day.

I am not ignorant that the whole
Doctrine propounded in the four
Propositions about the Insalubrity of
the Air, is not at all comfortable ei-
ther to Patients or Physicians: But
important Theories deserv'd to be
inquir'd into, and, if true, to be de-
liver'd though we could wish they
were untrue. And judicious men
rather thank than blame those that
have given us account of latent or
unsuspected, though perhaps irreme-
diable causes of Diseases and of death;
or have recorded the Histories of
some Poysons, whereof the true An-
tidotes are yet unknown. Uncom-
mon Notions about Diseases may
serve to enlarge the Physicians mind
and excite his attention and curiosi-
ty: and, besides that they may keep
him

him from too obstinately persisting in the use of receiv'd Medicines, though unsuccessful, upon a Supposition that the Disease can have no other causes, than those wont to be assign'd it by Classick Authours: besides this, I say; I do not despair, but that either the sagacity or fortune of this inquisitive age, or at least of Posterity, may by the blessing of God be happy enough to find proper Remedies, even for those Diseases that proceed from Subterranean *Effluvia*, when once by proper Signs they shall be distinctly discover'd; (Of which power of appropriated Remedies) I have known some Instances, as to the very bad Symptoms produc'd by Antimonial and some other Mineral Fumes.

Some of the Points discours'd of under the fourth Proposition, were of affinity enough to Paradoxes to have need of being illustrated or confirmed by Observations and Experiments. And therefore having accidentally retriev'd some of this
last

last nam'd sort, I shall venture to subjoin them as a *Specimen*, though without Transitions or Applications, but just as I found them thrown together, in one loose sheet, wherein I lighted on them. But it is time to conclude with the recital of the promised Experiments. Which I would immediately do, but that I hold it fit to premise, by way of Introduction to them, that I hope the Things hitherto discours'd will appear much the more probable, if we shall prove by Experiments, that which seems much less likely than any thing we have above deliver'd; namely, that Metals completely formed and malleable may be elevated into the Air, and that perhaps without any great violence of Fire, in the form of Exhalations and Vapours; the singly invisible Corpuscles still retaining their Metalline nature. This at least, as to some Metals, I have endeavour'd to prove in another Tract, [*entitl'd a Paradox about the Fuel of Flames.*] But because that

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Discourse was never publish'd I will here set down two or three Experiments, (not mention'd, that I remember in it.) Which I do, the more willingly, because it may be a Thing of no small moment in Physick, if it be shewn that Fixt and solid Bodies, such as Metals are, may by art be reduc'd into such minute Corpuscles, that without losing their nature and all their Properties, they may become parts of Fumes, or perhaps of invisible Vapours, or even of Flame it self.

*Particulars belonging to the
IVth Proposition.*

EXPER. I.

WE took three Parts or Pounds of *Dantsic Vitriol* (which is blew and somewhat partakes of *Copper*) and two Parts or Pounds of good *Sea-salt*; these being very well
pow-

powder'd and mix'd were distill'd with a strong naked Fire, to force out all that could be driven over: and by this means we not onely obtain'd a Spirit of Salt of a manifestly blewish Colour, but there ascended also a considerable quantity of Powder, which being shaken with the Liquor, settled at the bottom of it in the form of a Powder, which was judg'd to consist of Corpuscles of a *Cupreous* nature, and perhaps also of some of a *Martial* nature. But I unhappily neglected the opportunity of examining this Powder, which came up in quantity enough to have serv'd for various Trials.

EXPER. II.

By substituting *English Vitriol* (which is green, and is much more abundant in *Iron* than that of *Dantzic*,) and proceeding in other respects as in the former Process, we obtain'd a very yellow Spirit, with
a con-

a considerable quantity of a yellowish Powder, that was guess'd to be a kind of *Crocus Martis*.

EXPER. III.

We took very thin Plates of *Copper*, and cast them into a Retort, upon an equal or a double weight (for we did not always use the same) of good *Mercury Sublimate*; and luting on the Receiver, gave a Fire by degrees for several hours: by which means we usually obtain'd some running Mercury, (which seem'd to be very well purifi'd and was perhaps also impregnated) together with some Sublimate that had not fasten'd upon the Copper. And at the bottom of the Retort we had good store of a ponderous and brittle substance, that did not look at all like a Metal, but rather like something of a Gummous or Resinous nature, being also fusible and inflammable almost like sealing Wax. This, having not opportunity to pro-

prosecute the Experiment at home, I put into the hands of an industrious Physician, that was earnest with me to impart to him the Process, and let Him pursue it for me. He according to my direction expos'd this *Metalline Rosin* (if I may so call it) grossly beaten to the free Air, where it did, according to Expectation, in a short time change Colour, and turn to a kind of *Verdegreece*: which being dissolv'd in good Spirit of Salt gave a Solution of a very lovely green Colour. This being slowly distill'd *ad Siccitatem*, yielded but a very weak and phlegmatick Liqueur; and the *Caput Mortuum* was again dissolv'd in fresh Spirit, and the *Menstruum* abstracted as before. This was done several times, till the matter was so impregnated, that the *Menstruum* being drawn off from it, came over as strong almost as when it was put on. This done, the thus impregnated *Verdegreece* was diligently mingl'd with *Tripoly*, or some such insipid and fixt additament, and

and distill'd with a strong Fire; by which means it afforded good store of a Liquour Colourless like common Water: which made the Physician suppose the Experiment had miscarry'd, till I having dropt into it a Colourless Liquor, namely Spirit of Hartshorn or of Sal-armoniac; He was much and delightfully surpriz'd, to find it presently disclose a deep and lovely blew Colour. What afterwards became of this odd Spirit, I need not here declare; what has been said being sufficient, to shew that Corpuscles of Copper may be elevated in the form of Exhalations both transparent and Colourless. The next following Experiment though in part mention'd by some Chymist is here subjoin'd, because it's necessary and applied to a particular purpose.

EXPER.

EXPER. IV.

If from good *Cornish Tin* you warily distill an equal or double weight of *Venetian Sublimate*, into a very large Receiver very well luted on to the Retort, you will obtain a spirituous Liquor, which as soon as the free Air comes to touch it, will send up abundance of white Exhalations in the form of a thick Smoak, which will continue to be emitted much longer than one would imagine. But that which I desire to have particularly observ'd in this Experiment is, that though this Liquor be thus apt to emit Smoak, not onely plentifully, but as one would think with Violence, yet I found by Trial, that even when I put it into a Vessel not strait mouth'd, if I did but lay a piece of a single leaf of Paper flatwise upon the Orifice of the Glas, so as to cover it all, the visible production of the Fumes would presently cease; and the Liquor would lie
like

like common Water, as long as the Paper lay, though but lightly upon the Glass; though upon the Removal of that, the Liquor would send up plentiful Fumes as before, which seems to argue, that some Metalline Substances may, by the contact of the *Air*, have their Copious ascension into the Atmosphere very much help'd and promoted, as if the *Air* had Saline or other sort of Particles in it, that are in reference to some Mineral Bodies of a very volatilizing nature. The way by which I have divers times elevated the Fixedst of Metals, *Gold* it self, I have deliver'd in another Paper, and shall not here repeat it. But I shall now set down an Experiment that when it is carefully made, is easie to be perform'd, and yet affords a notable and sensible Proof, that the Corpuscles of a Metal may be made to ascend, and that plentifully, even with a very moderate Heat, under the form of ordinary Fumes or Smoak.

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To effect this I devis'd the following Experiment.

We took *Copper* and dissolv'd it in good *Aqua fortis*, till the *Menstruum* was Satiated with it, in the strong Solution we steep'd a while some brown or other porous Paper, that being fitter than the finer, to soak up the *Menstruum*; then slowly evaporating the superfluous moisture, we put a quantity of this imperfectly dry'd Paper upon the Hearth, at such a distance from a Fire of actually flaming Wood that the Paper was not kindled, but yet was so scorch'd, as to afford very plentiful Fumes: these look'd like ordinary Smoak, whilst they mov'd through the Air, and would questionless have mingl'd with it, and been dispers'd through it, if the Body that emitted them had not been purposely plac'd for a future design. But when the motion of the Air towards the Flame had carry'd these Fumes
to

to it, the Metalline Smoak did,
as I expected, disclose its nature;
for being actually kindled, it
ting'd the Flame of a lovely Co-
lour, for the most part Blew,
and sometimes Green, as it hap-
pen'd to be variously mix'd with
the Flame and Smoak of the Wood.

T H E E N D .
